JANUARY 1951

Plant Engineering

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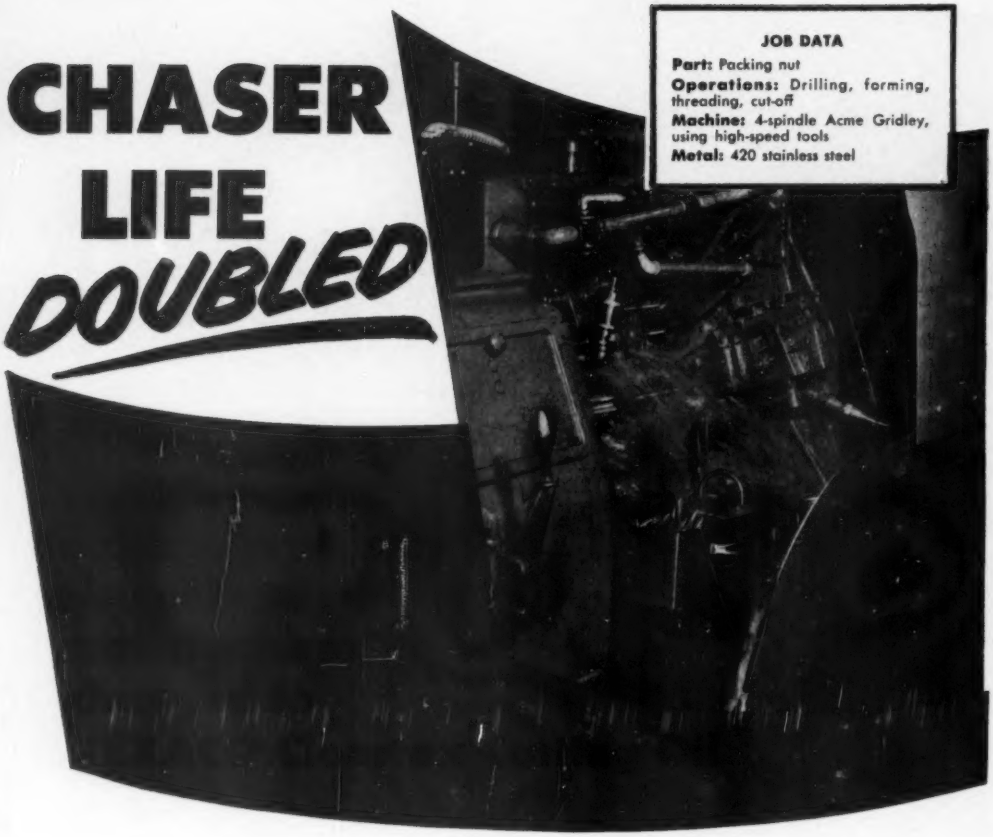
Volume 5, No. 1 Circulation of this issue 31,164

The magazine that helps plant engineers with their everyday problems

CHASER LIFE DOUBLED



JOB DATA

Part: Packing nut
Operations: Drilling, forming, threading, cut-off
Machine: 4-spindle Acme Gridley, using high-speed tools
Metal: 420 stainless steel

The stainless steel used on this job is one of the toughest metals to machine. Operators reported their greatest difficulty was frequent breakage of the threading chasers, none of which lasted more than three shifts (24 hours). In addition, leakage of machine lubricant into the cutting fluid caused contamination and high oil consumption.

At the suggestion of a Texaco Lubrication Engineer, the competitive cutting fluid and machine lubricant were both replaced by *Texaco Cleartex Cutting Oil*. Chasers now last six shifts (48 hours) *—double the life!* Because *Texaco Cleartex Cutting Oil* is dual-purpose—designed to serve as both cutting fluid and machine lubricant – contamination has been completely overcome and oil consumption materially reduced.

Still another advantage gained from the change to *Texaco Cleartex Cutting Oil* is that either steel or brass can be worked without changing oils. *Texaco Cleartex Cutting Oil* does not stain.

Let a Texaco Lubrication Engineer—specializing in machining—help you gain similar cost-saving benefits in *your* plant. There is a complete line of Texaco Cutting, Grinding and Soluble Oils to assure better, faster, lower-cost machining, whatever the metal or the method of working it.

Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, New York.

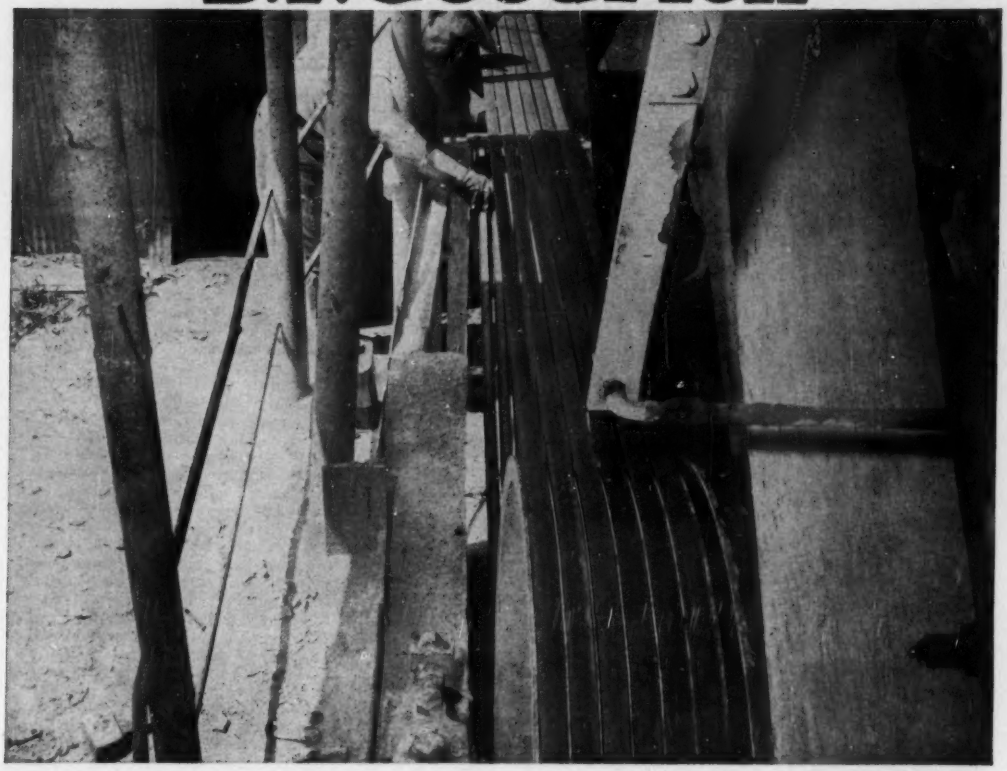
*Name on request

TEXACO

TEXACO CUTTING, GRINDING AND SOLUBLE OILS FOR FASTER MACHINING

TUNE IN . . . TEXACO presents MILTON BERLE on television every Tuesday night. METROPOLITAN OPERA radio broadcasts every Saturday afternoon.

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER



Where failures meant shutdowns they changed to grommet V belts

B. F. Goodrich grommet V belts cut costs 20 to 50%

POWER transmitted here drives a rock crusher 8 hours a day, 5 days a week. When the drive stops, rock crushing stops and the plant shuts down. Previous V belts suffered from shock loads, wore out fast. A BFG man recommended the grommet V belt to stand the jerks and hard pulls. The grommet V belts shown here have been in service 2 years, with no shut-offs or shut-downs for maintenance. Here's why the grommet V belt lasts 20 to 50% longer:

No cord ends — A grommet is endless, made by winding heavy cord on itself to form an endless loop. It has no overlapping ends. Because most of the failures in ordinary V belts occur in the region where cords overlap, the endless cord section in a grommet V belt eliminates such failures.

Concentrated cord strength — All of the cord material in a B. F. Goodrich grommet multiple-V belt is *concentrated* in twin grommets, positioned close to the driving faces of the pulley. No layers of cords to rub against one another and generate heat; cord and adhesion failures are reduced.

Better grip, less slip — Because a grommet is endless, a grommet V belt is more flexible, grips the pulleys better. Size for size, grommet multiple-V belts will give ⅓ more gripping power, pull heavier loads with a higher safety factor.

Only B. F. Goodrich has the grommet! — No other multiple-V belt is a grommet V belt (U. S. Patent No. 2,233,294). At present made in C, D and E sections only. See your local B. F. Goodrich distributor. Ask him to show you his "X-ray" belt that illustrates grommet construction clearly. *The B. F. Goodrich Company, Industrial and General Products Division, Akron, Ohio.*

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RUBBER FOR INDUSTRY

PLANT ENGINEERING

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'ROUND ABOUT with the editors in field and office

The Pallet Boys Win! Half Fourth Class Rate Over Wide Area

CLIMAXING a battle of many years standing, the Interstate Commerce Commission has just approved a lowered return freight rate on empty pallets.

The approved rate, for one-half of fourth class, covers pallets, skids, platforms, knocked down or folded flat shipping containers in any quantity when returned over the routes of carriers which transported the loaded containers. It applies to truck shipments between points in Illinois, Indiana, Kentucky, Michigan, Missouri, Ohio and Wisconsin. Other states may be covered later upon petition.

News of Plant Engineering Clubs Across the Country

San Francisco: Annually the Research Department of the S. F. Chamber of Commerce compiles and publishes a list of professional organizations in the Bay Region. The new edition includes the Plant Engineer's Society of S. F. formed in March 1950 (See PE page 47, May 1950 issue).

New members attending the meeting on November 9 include: GEORGE GELLANTLY, General Metals Corp., Oakland; R. L. PETERSON, Mare Island Naval Shipyard, Mare Island; B. C. FLEET, Bethlehem Pacific Coast Steel Co., San Francisco; and JAY BESORE, Johnson Specialty Co., San Francisco.

The main discussion of the meeting, led by W. T. WALTERS of General Metals Corp., dealt with floors and flooring; abrasive and slip-proof types; cleaning and patching concrete; fill-in between wood blocks; cleaning and cleaning machines.

President ROLLIN LOBAUGH, Pacific Screw Products, appointed the following committees: By-Laws, E. F. SULLIVAN, JAY BESORE, C. B. OLMSTED and K. M. PAULSON; Program, F. M. REBIN; Membership, W. J. NORMAN, Victor Equipment Co., GA 1-3000; R. L. PETERSON, Mare Island Naval Shipyard, Vallejo 3-4511, Code 366 and E. B. BRIDGETT, California Pottery Co., Niles.

At the following meeting on December 7, the constitution and by-laws prepared by the committee were adopted. This is simple and in seven sections: Set forth the purpose of the organization as to protect, disseminate knowledge of, and advance the interests of, the plant engineer; define those eligible for membership; provide for two officers, president and secretary; set annual meeting dates for election of officers; specify that no dues will be levied; and set the order of business of regular meetings.

Monthly meetings are held on the second Thursday of each month. President is ROLLIN LOBAUGH, Pacific Screw Products, He 1-3981; and secretary is E. F. SULLIVAN, San Francisco Naval Shipyard, Valencia 4-1900, Ext. 2366 or 110 Maude Street, Sunnyvale. Plant engineers in the Bay Region interested in joining the Society should contact either of the above or any of the membership committee for details.

New York: The Plant Engineers' Association of N. Y. held the first meeting of the 1950-51 year on October 17. The main address, delivered by MALCOLM PIRNIE, dealt with the engineering phases of the Incodel Project on which Mr. Pirnie was consultant.

Contracted from Interstate Commission on the Delaware River Basin, this is a $550,000,000 project undertaken by the four states of New York, New Jersey, Pennsylvania and Delaware. A series of 11 reservoirs on the Delaware River will safeguard domestic and industrial water supplies, give flood control, clear up polluted streams, enhance recreational areas on the upper river stretches and eliminate salt water problems in the tidal areas.

The second meeting of the year held November 21 was sponsored by H. O. MAY, plant engineer of the Crocker-Wheeler Div., Elliott Co. The subject Motor Application was covered by H. S. PAHREN, J. J. SOUSA and C. P. PACKARD all with Mr. May's company.

On December 19 the meeting was in charge of L. B. WOOLFENDEN, General Aniline & Film Corp. The speaker was DAVID E. PIERCE, chief engineer of General Aniline, who spoke on Budgeting Repair Costs. For some years the corporation has used kilowatt-hours as a common denominator for maintenance costs. The author presented a comparison of actual costs with budget figures.

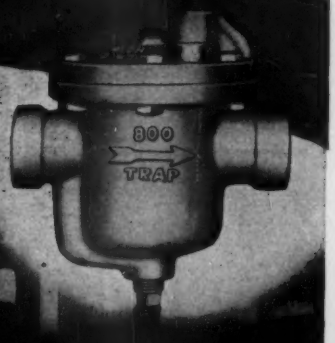
Philadelphia: More news of this new club later.

Drop In and See Us at the Maintenance Show

THE PLANT MAINTENANCE Show in Cleveland promises to be an outstanding event for men in all plant engineering groups. Many of the readers of PLANT ENGINEERING will be in attendance and we wish to extend a cordial invitation to all to drop in at Booth 504.

Your motives aren't important; you can gripe, or praise; complain about the Government, high taxes, the state of your health; or just sit and think. We hope to have a brand new model (plant model, that is) in the booth, extra copies of PLANT ENGINEERING, applications to receive PLANT ENGINEERING regularly, and several pairs of attentive editorial ears.

CASTS A MIGHTY BIG SHADOW!



● **LOAD ON BOILER CUT BY 75 HP** by trapping with Armstrongs, says Chief Engineer of large midwestern hospital.

● **30°-40° TEMPERATURE INCREASE** on 8-roll ironer after unit trapping with Armstrongs, reports large eastern laundry.

● **STARCH DRYER HEAT-UP TIME CUT 2-3 HOURS** after retrapping with Armstrongs, says Canadian plant engineer.

● **125 HP BOILER NOT NEEDED** — 80 HP boiler does the job since Armstrong traps were installed in a chemical plant in Iowa.

● **50% SAVINGS IN TRAP MAINTENANCE LABOR COSTS** since installing Armstrongs at midwest agriculture machinery plant.

● **COOKING KETTLE OUTPUT SPEEDED UP 30%** by Armstrong unit trapping at large canning plant.

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Write for STEAM TRAP BOOK — 36 pages of useful, how-to-do-it data. Free on request.

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ARMSTRONG STEAM TRAPS

take this view

Of Your Plant's Electrical System

Distributing electrical power to operate your plant is more than just wiring between transformers and equipment.

The electrical distribution system's flexibility, service continuity, regulation, and efficiency can have a decided effect on your operating economy. There is no all-purpose system to balance these factors . . . to best meet all your needs. That's why it's imperative that your plant have a modern distribution system specifically planned to meet *your* individual requirements.

Power centers provide the simplest way—the low-cost way—of attaining the system you require. Westinghouse Indoor Dry-Type Power Centers also give you these advantages:

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THEY'RE SAFER—from the hazards of fire and explosion; they have no exposed live parts. Breakers and switches have positive interlocking mechanisms, each in its separate compartment.

Your Westinghouse Representative will be glad to discuss your system problems with you. He is prepared to offer complete system information, with advantages of each carefully weighed. Ask him for Booklet B-4045, *"Industrial Plant Distribution Systems"*, B-4162, *"Power Centers by Westinghouse"*. Or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-60731

PRIMARY SELECTIVE RADIAL SYSTEM

Low operating and maintenance costs, with moderate initial expense, make this system excellent for installations where the requirements for flexibility, and service continuity are average. To evaluate this system in terms of your requirements, consult your Westinghouse Representative.

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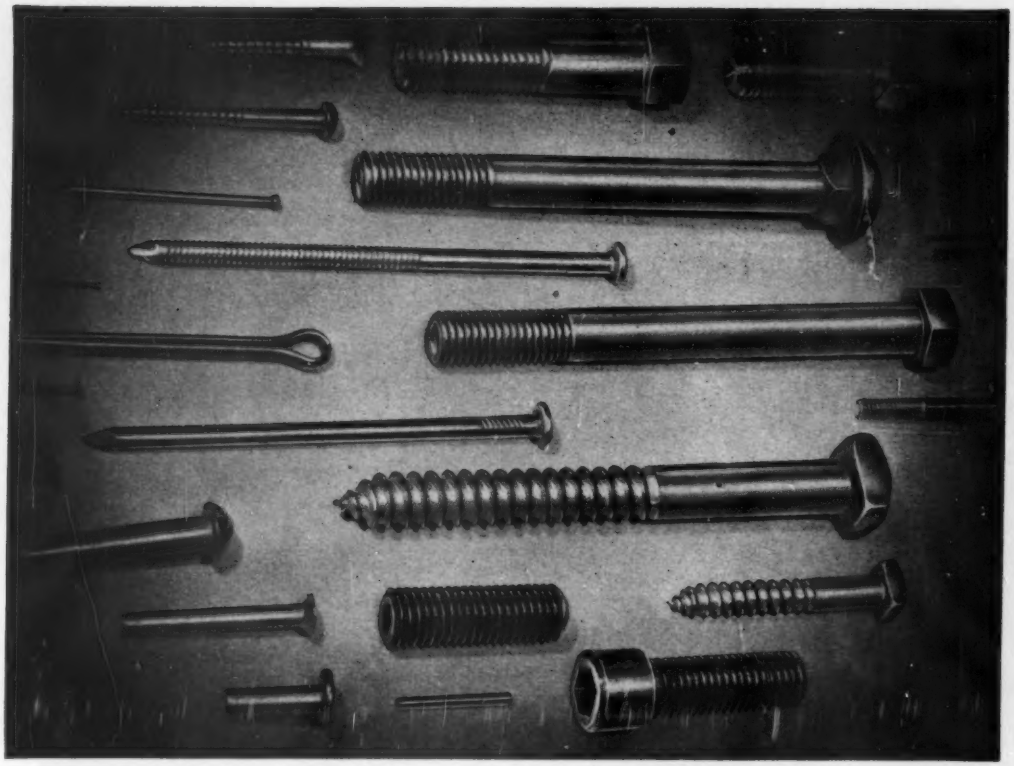

24 Ways to Be Safe Instead of Sorry!

THERE ARE FEWER REPLACEMENTS ON TOUGH JOBS WHEN DURABLE MONEL FASTENINGS ARE USED

How a Transit Company Put Monel Fastenings to Work

Perhaps you have to take off your auto license plates only once a year. But chances are it's a job you hate to tackle because the nuts and bolts have been "frozen tight" by rust.

A bus company has to do that job on scores of buses. But it's not a tough job to one company we know. This company uses *Monel* nuts, bolts and washers to mount their plates. They never have a bit of trouble. And those Monel fastenings will outlast any vehicle.

Outdoors or indoors . . . in water or in corrosive fumes...Monel® fastenings will be on the job long after ordinary fastenings have failed.

Why? Because Monel fastenings give extra protection against rust . . . corrosion . . . overstressing . . . shock . . . vibration . . . heat . . . cold.

Take corrosion. Monel offers broad protection. It resists alkalies, salts and most acids. It's 100% rustproof, too.

Take mechanical properties. Monel offers plenty of "extras." Compared to the free-cutting steel used in ordinary fastenings, Monel is 20% stronger . . . 30% more ductile . . . 40% tougher.

Take extreme temperatures. No worry there. For Monel fastenings are safe at high heat or in sub-zero cold.

And did you know this? *Any* type fastening is produced in longer-lasting Monel.

Since all metals are in short supply today, you may have to wait a while for the Monel fastenings you want.

But remember Monel fastenings for the many extras they add to plant or product use. Products perform better . . . plants have fewer maintenance demands, when the tough fastening jobs are given to Monel.

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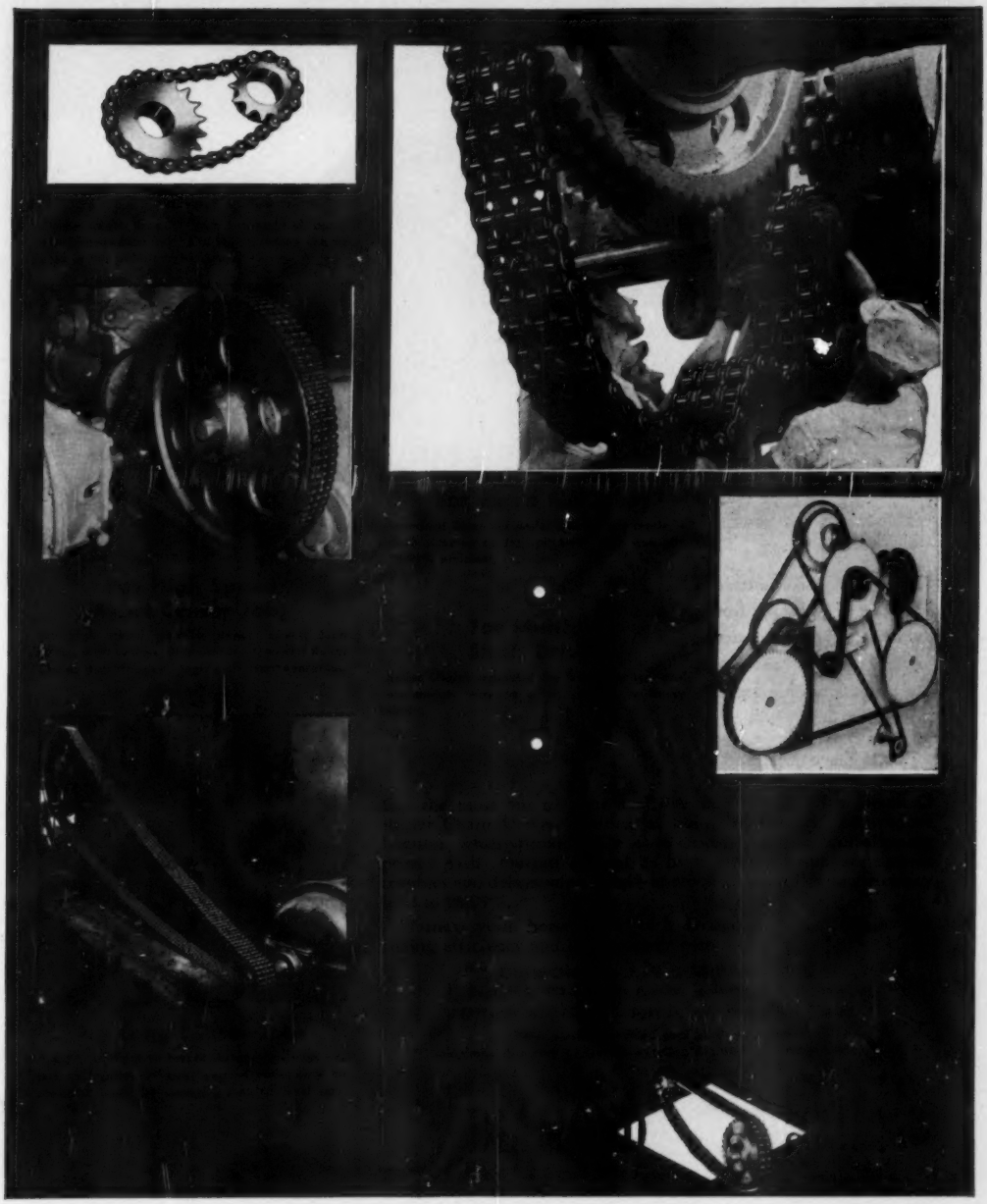
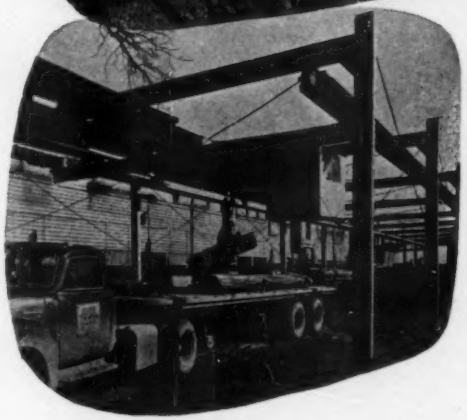
Harness Your Horsepower with
DIAMOND ROLLER CHAINS



15 Tons of Bar Stock Unloaded and Stored in 30 Minutes



It takes only 30 minutes, with 3 men, to unload 15 tons of bar stock from trailer to storage yard with this 5-ton American MonoRail crane. An average of 27 tons per day from storage yard to processing is a smooth continuing operation day after day.

This is the easiest and best way to handle bar and sheet stock because American MonoRail Overhead Handling Equipment increases production, saves labor, saves time, and cuts costs.

American MonoRail engineers will gladly show you how automatic handling pays and saves. Write today — ask for Bulletin C-1.

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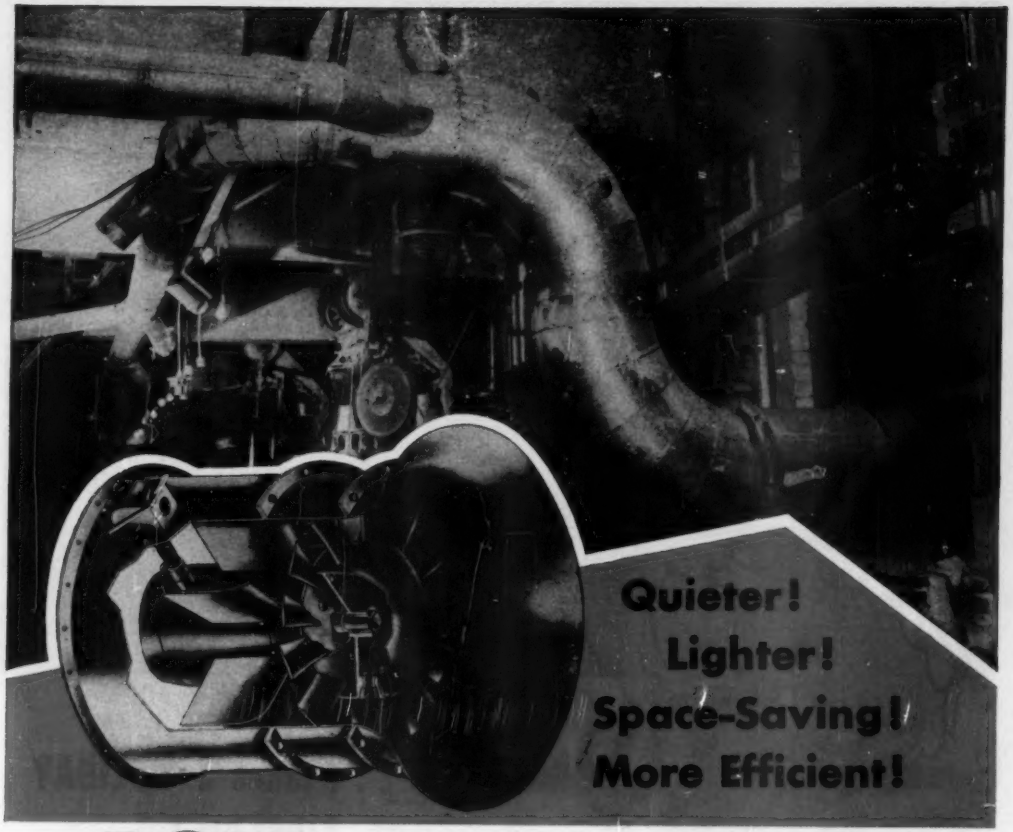

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(SERIES 1000)

Write for Bulletin, or

Consult a Joy Engineer

The quieter operation, lighter, more compact design, lower power consumption and unmatched efficiency of JOY Axivane Fans are *real* advantages! What's more, their vaneaxial design and in-line construction permit mounting right in the air duct, making installation simple and saving greatly on time and cost. These features, plus the extreme flexibility of operating range made possible by adjustable blades—a standard feature of all JOY Fans—mean better, more dependable and lower-cost ventilation, no matter what your conditions are.

● Let JOY Axivane Fan specialists work with you for best results on your ventilation jobs.

*Reg. U. S. Pat. Off.

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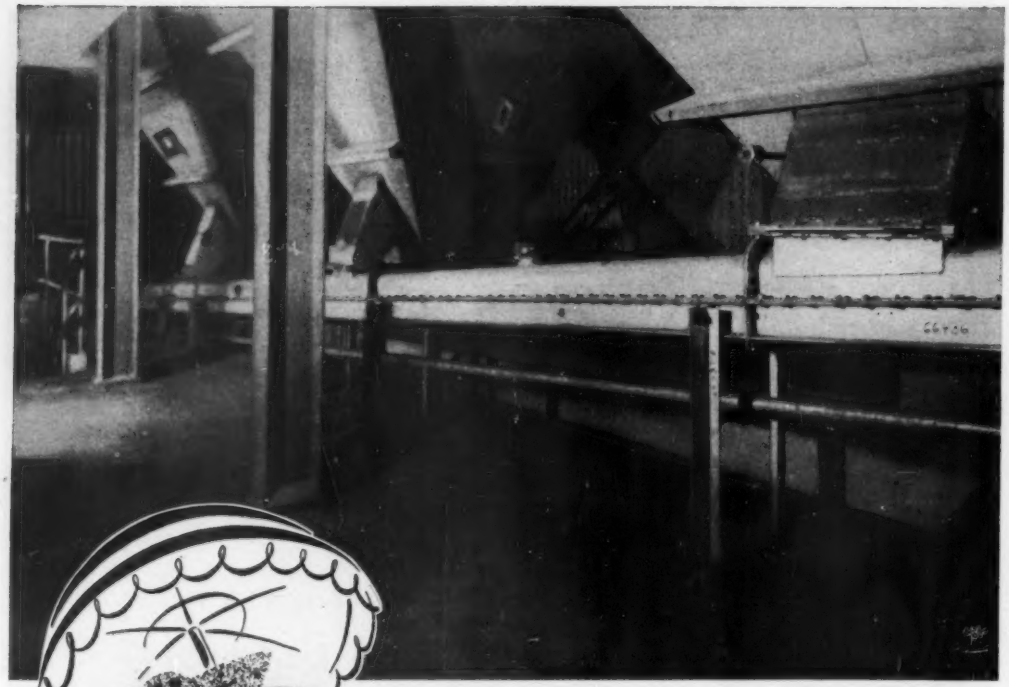

DUST . . . takes a HOLIDAY with AIRSLIDE!

Here's a revolutionary type of conveyor that has no moving parts . . . aerated material moves itself—by gravity. In this system, materials such as precipitated stack dust, cement, lime, gypsum, starch, and similar products are fluidized or aerated and made to flow like water down an inclined duct. By introducing air into the material through a porous medium, inter-particle friction is reduced and the angle of repose practically disappears. Thus the material flows, completely enclosed in a contamination-proof trough.

For sheer simplicity, low maintenance cost and ease of operation . . . it's just about tops. A small volume of low-pressure air is the only power required! Such factors as noise, breakdowns and costly repairs are gone forever.

We've had years of experience in the manufacture of five distinct types of pneumatic conveyors designed for handling material at the low cost per ton. If your conveying costs are high, why not let us study your problem? We'll be glad to do so and recommend, without obligation . . . the types or combination of types best suited to your requirements.

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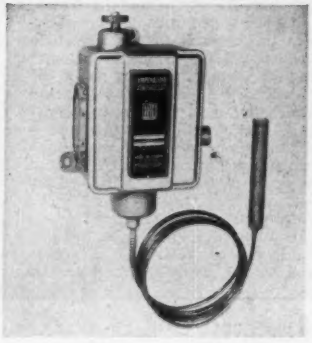
DRY MATERIAL CONVEYING SYSTEMS
AND COOLERS—COMPRESSORS AND VACUUM PUMPS—
FEEDERS, AND ASSOCIATED EQUIPMENT

NON-INDICATING CONTROL DEVICES SERVE ALL INDUSTRIES

Production and maintenance operations throughout all industries are benefiting by a growing utilization of automatic control devices which are non-indicating and non-recording.

Common practice indicates their widespread acceptance for a host of applications which do not require the indication and recording of process variables.

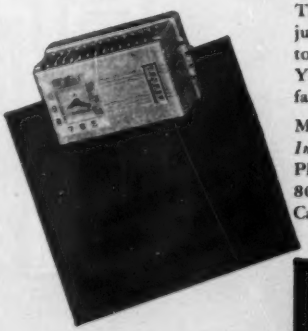
The Minneapolis-Honeywell Regulator Company lists more than eight thousand of these control devices for accurate and dependable control of temperature, pressure, humidity and combustion safety . . . for fluids, gases and electrical circuits. The devices are broadly classified by consideration of the medium through which control is secured . . . electronic, electric, pneumatic, and a combination of electric and pneumatic. The types of control available include On-Off, Two-Position, Floating and Proportional.



Non-Indicating Temperature Controller

The Industrial Division of Honeywell is currently conducting a contest . . . offering a Honeywell *Chronotherm*, quality home thermostat, to production and maintenance men who submit descriptions of practical industrial applications for the control devices. According to a recent release from the company, anyone whose position qualifies him for entrance in the contest should send his idea to MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 4491 Wayne Ave., Phila. 44, Pa. The same address may be used to secure a copy of Catalog 8303 which contains detailed information on a representative group of the complete line of Honeywell Control Devices.

do you have an [redacted] for the HONEYWELL CONTROL DEVICES CONTEST?



Just send us a sketch and description of how a non-indicating control device is now being used to help keep things running smoothly in your plant. Think about it! Then send it in! The impartial board of judges will rate it in terms of its importance to the maintenance of plant operations. You may win a *Chronotherm* . . . Honeywell's famous home thermostat!

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Honeywell

BROWN INSTRUMENTS

PLANT ENGINEERS' DIGEST so those who rush may read and know what's new

Accordion Ladder

THIS NEW portable folding ladder developed by Fairchild Aircraft Div. assists crew members entering and leaving XC-120 Packplane.

The collapsible ladder meets both strength and storage requirements. Built on the principle of the collapsible gate, the ladder expands to fifteen feet when in use or collapses to a mere three feet for easy storage under the navigator's table when the plane is in flight. It weighs approximately 29 lb and may be easily handled by one man.

The short and tall of collapsible ladder for entering and leaving plane, also used for servicing

In addition to its primary use, the ladder may also be used for servicing the airplane. Special hooks on the end of the ladder fit any one of ten pair of keyhole slots strategically located near fins, rudder, tail booms, oil tanks and windshield. *From FAD, a publication of Fairchild Aircraft Div., Hagerstown, Md.*

How Big Is a Coal Pile?

LIKE THE man who checks his coal bin to see if he has enough to last the winter, Union Electric surveys its extensive coal stockpiles at each plant every 2 yr—as a double check on its paper inventories.

Coal is weighed in as it enters the yards and checked out as it goes to the hoppers, so the engineers and accountants know about how much of it is around at all times. But when a pile gets low, a surveying party goes out with transit, rod and a little black book.

To measure a pile of coal accurately you have to know what the bottom looks like, and this has to be done in advance. So the engineers survey a new yard before coal is heaped on it. A base line, which is never covered, is established between two known stationary points. The storage area is divided into 50 ft squares to form a base grid and corner elevations of these squares are recorded.

The surveyor measures the pile in cross sections perpendicular to the base line by determining its elevation at points above the corners of the base grid squares. He also obtains elevations of any irregularities in the surface of the pile and their distance from the base line.

Survey figures go to the Steam Engineering Department where cross section graphs are prepared. From these they can figure the area of each surveyed section. By multiplying the average vertical section by the length of the pile, they find its volume.

A cubic foot of coal weighs from 70 to 75 lb, depending on how tightly it's compacted. To find the average weight of any stockpile, the volume of a sample section weighing up to 1000 t is checked as it is removed to the hoppers. This average weight can be multiplied by the volume of the entire pile and the result is the estimated weight of coal on hand at that spot.

The surveys are accurate within 2 per cent and this slight discrepancy may be due to addition or loss of moisture in the coal after delivery. However, this procedure lets the company know, within reason, how much coal it has and how much it has used up. And when you burn up a couple of million of anything, you want to know where it went. *From Union Electric Quarterly, a publication of Union Electric System, St. Louis 1, Mo.*

Stainless Steel is Really Hot When Worked at Minus 300 F

STAINLESS STEEL is a versatile metal. Due to keen observation of a routine test of low temperatures its range of usefulness may be further extended. At Crane Co. laboratories impact tests of cast stainless steel were conducted at the temperature of liquid nitrogen, about minus 300 F. Magnetism was later noted on one specimen. This was a significant point, duly noted and followed up. It was also followed up by the Westinghouse Research Laboratories, with the following results.

Best results were obtained by a short period of heat treatment at about 2100 F; quenching in water; cooling to about minus 300 F; rolling the metal while at that temperature from 0.25 down to 0.625 in.; and aging for several hours at about 750 F. Tensile strength, yield stress and hardness were all increased as compared to conventional rolling; proportional limit was more than doubled; and torsional yield stress and fatigue strength were increased by about one half.

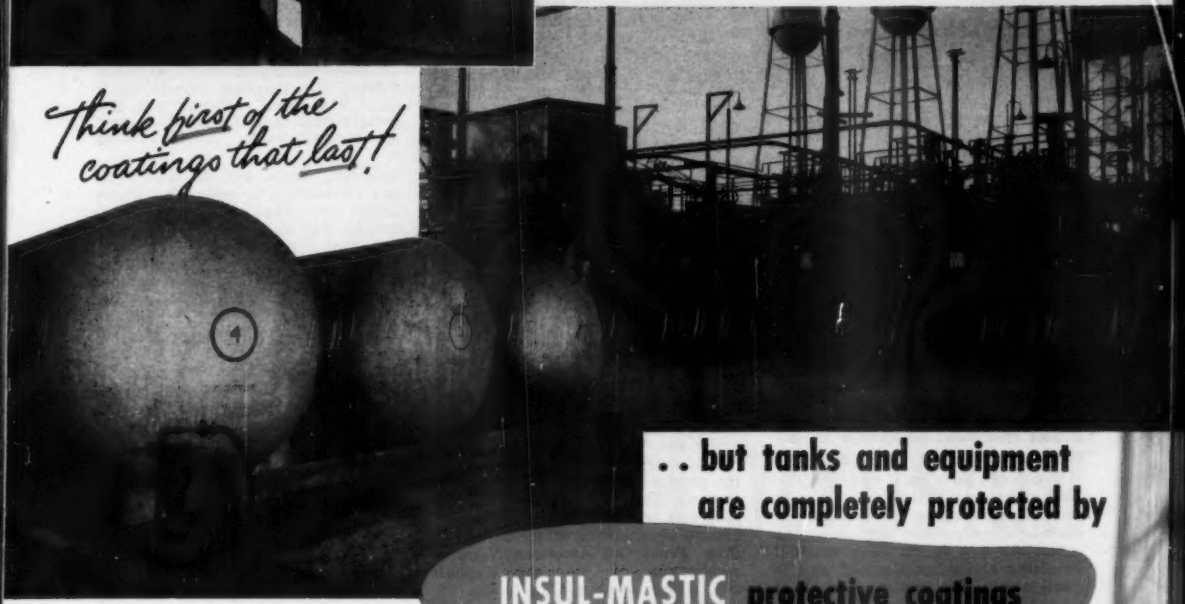
Austenitic stainless steels worked by conventional methods have a very low wear resistance, as compared to the wear-resistant metals

Display Case Shows Examples of Cost Reductions

A new display case is set up at Maytag Co., showing examples of cost reductions which have been effected through the Employes' Idea plan. Two winners look on

ACID ACID EVERYWHERE

think first of the coatings that last!



.. but tanks and equipment are completely protected by

INSUL-MASTIC protective coatings

Keeping tanks and metal structures from corroding when they are located in the middle of an acid plant, is a tremendous job. But here at the American Cyanamid Company's Calco Chemical Division Bound Brook Plant, *Insul-Mastic* protective coatings are constantly keeping fumes, sprays and spillages from reaching the metal equipment. The acids just don't get a chance to start their corrosive action.

There is no need for continual maintenance either. Once a tank is coated with *Insul-Mastic*, it is forgotten as far as repairs are concerned. *Insul-Mastic's* protection is good for a great many years.

Quality is the reason for this performance. And quality is the reason that Gilsonite *Insul-Mastic* is used in so many industries where corrosion problems exist—no matter how severe or how ordinary.

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of the cobalt-chromium base alloy types which have excellent resistance to wear under sliding friction. Yet one of the specially processed stainless steel specimens, differing slightly in composition from the others, showed a wear performance equal to or better than the best. The possibility exists that these unusual results can be reproduced consistently. If so, the horizons for stainless steel have indeed been significantly expanded. *From a news release of the Westinghouse Electric Corp., Pittsburgh, Penna.*

Roll Your Own Canal

MOVING WATER on a farm is usually done in small canals—canals dug into the bare soil. But running water down a simple unlined canal can be mighty wasteful. Seepage loss of the water turned into such canals has been known to run up to 60 per cent!

A couple of years ago the Cal Research chemists went to work on an idea for a simplified, inexpensive canal lining. They wanted a lining that the farmer could put in himself. One that would stop the seepage, and stop the bothersome weeds, too. What they ended up with was a prefabricated lining prepared in sheets which could be rolled up like roofing paper. The lining was composed of sandwich-like layers of asphalt and aluminum foil.

More field tests were made under the direction of the Bureau of Rec-

Putting a waterproof surface on a canal is a simple procedure with this prefabricated canal lining. These men are applying sealer between linings

lamation. Canal sections near Walnut Creek, Calif., and near Boise, Idaho, were lined with the test materials. The sheets were laid across the canal from one side to the other, one sheet overlapping three inches on the other. An asphaltic cement binder like that used on roofing paper was applied to the joints to make the whole job waterproof. Both installations proved to be successful. *From The Standard Oiler, a publication of Standard Oil Co. of California, San Francisco 20, Calif.*

Preventing Hidden Roof Leaks with Asphalt Products

WHEN RE-ROOFING or repairing an old roof be sure to realize that there are several places other than the roof itself that need attention in order to make a watertight biulding. Chief among them is the wall area above the roof line.

When originally built, these wall areas were for the most part soundly constructed and shed the water adequately. Time, however, has weakened many of them by the gradual loss of mortar from the joints, and even to the spalling of the masonry.

Leakage under the above conditions is a result of the water originating on the wall surface seeping down, through soft masonry units and through deteriorated mortar joints, behind the counter-flashing of the roof and down into the building. It is under these conditions that a wall treatment becomes a necessity.

The first operation is to prime the wall with an asphalt primer. Primer soaks into the many pores of the old surface, incorporates any fine, dry materials that might have resisted brushing and when the old wall is particularly dry, moistens it so it will not rob the adhesive of its life-giving oil.

The second step is the application of flash gum, either winter or summer grade, according to the time and conditions of application. Flash gum may be applied with a trowel, a squeegee or by hand, and slips from the applicator without perceptible drag. It may be applied on a vertical wall in thicknesses up to ¼ in. without sag, even in extremely hot weather.

The third step is setting the felt into the adhesive. The felt is brought up over the top of the wall, which has also been covered with flash gum. The bottom of the felt is brought down over the cant to get proper drainage. After the felt has been set into place and pressed firmly in the cement, it is covered with another coating of flash gum.

As a final step toward a good job, the top coat of flash gum is brushed with asphalt primer, the purpose of which is to insure that there are no voids or vacanices left in the surface covering. The ridges of hand or trowel marks are smoothed out and the completed job assumes a bright, workmanlike finish. This top surface sets quickly and films over to form a weather and water tight surface. *From Old American News, a publication of American Asphalt Roof Corp., Kansas City 3, Mo.*

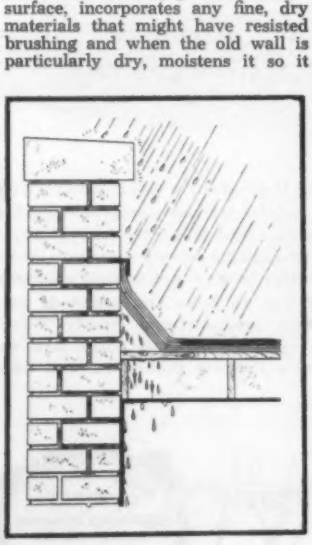


Fig. 1. This drawing shows clearly how water may seep through old walls, finally emerging inside or on the ceiling

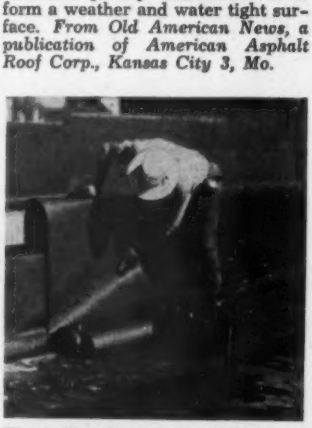


Fig. 2. After applying primer and flash gum, the saturated felt is set into flash gum. The surface of the felt is brushed

Titanium—The Wonder Metal

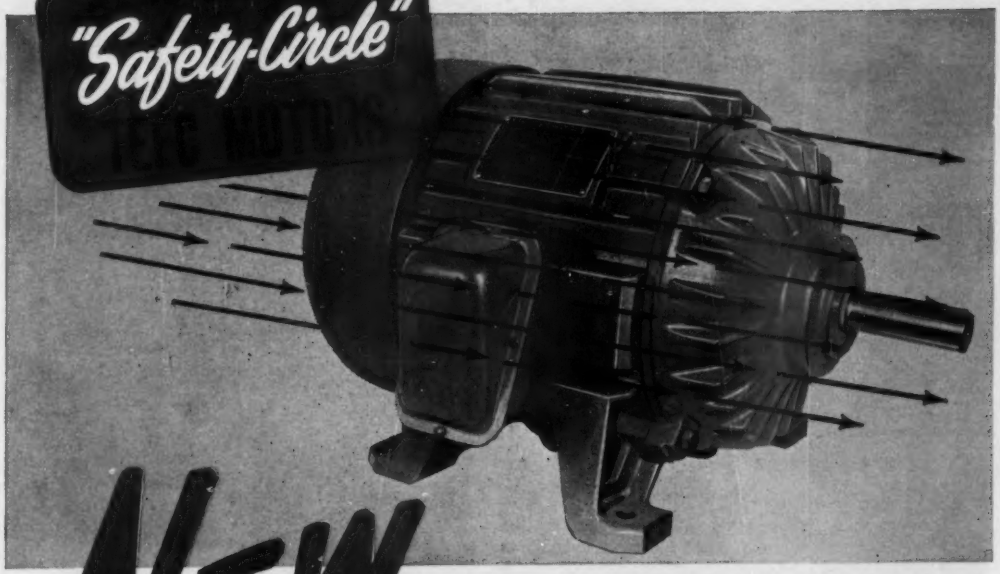
TITANIUM IS the fourth most abundant of all structural metallic elements in the earth's surface. It was discovered in 1791 by an Englishman, William Gregor. A few years later an Austrian named Klaproth, who also named Uranium, gave it the name Titanium after the mythical Titans—Sons of Earth. It has the properties of being impressively light, strong, corrosion-resistant.

Since the early Twenties it has had very widespread use in white house-paints, paper making, white-wall tires, face powder, white shoes and glass making, as well as in textile printing and plastics.

As a commercial metal it was produced in late 1946 as a result of work by the U. S. Bureau of Mines and the process of W. J. Kroll. The Kroll process is an involved chemical reaction producing a titanium sponge which in appearance is a great deal like ordinary gray coke.

Extensive application of the metal for industrial use has been limited because of the high cost to the user of from $10 to $20 per pound and because of limited production. The production bottleneck has been widened considerably this year by

(Continued on page 22)



NEW Easy to Clean Resists Corrosion

CORROSIVE ATMOSPHERES CAN'T HURT this Allis-Chalmers totally enclosed, fan-cooled motor because major parts are enclosed in a rigid corrosion resistant cast iron frame! No extra treatment is needed and cast iron's corrosion resistance won't chip off.

Lower Maintenance, Too

No corners, pockets or hidden air passages to collect dirt. Cleaning is the simplest of maintenance operations. Just blow off the dirt with an air hose. Fan and housing design keep cooling airflow tight against the yoke so dirt does not accumulate and cleaning is seldom required.

Factory Lubricated Bearings

Bearings are lubricated at the factory and operate without attention or cost for years. Extra rigidity of the cast iron frame holds bearings in true alignment under all operating conditions. This gives long bearing life and low operating costs.

Get All The Facts

The new *Safety Circle* totally-enclosed fan-cooled motor is built in all NEMA standard frame sizes from 224 to 505. Call your nearest Allis-Chalmers Authorized Dealer or Sales Office for complete information or write Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for Bulletin 51B6144. A-3228

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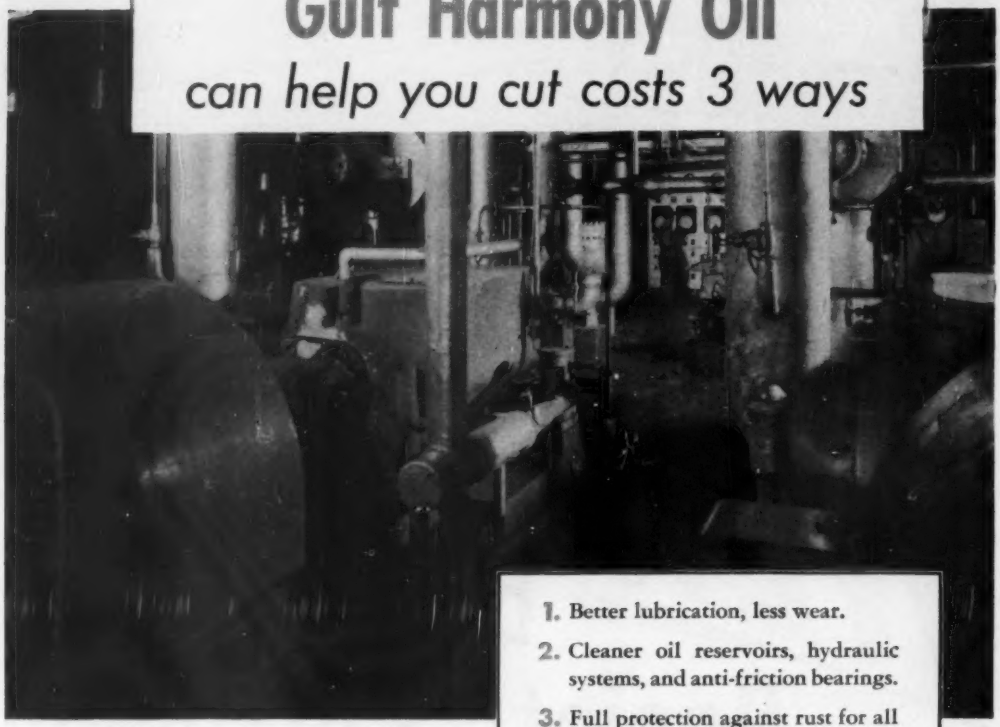

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3. Full protection against rust for all oil-bathed surfaces.

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MATERIALS HANDLING

101 **Crane and Monorail Advantages**—Bulletin M-20 is a 20 pp, fully illustrated catalog on company's Trambeam, a light crane and monorail system designed for low-cost handling of loads from 250 to 20,000 lb. This catalog is not intended to show technical details, but rather to give plant engineers a summary of the reasons where and how Trambeam may be economically used. It does, however, contain material of lasting interest and is a valued addition to materials handling reference files. Whiting Corp.

102 **How to Select Passenger Elevators**—For plant engineers planning to install passenger elevators, 56-pp Booklet B-4572 will serve as both buyers' guide and reference book. Information presented includes pictures, diagrams, curves, tables and case examples. Sections are devoted to types of controls and how to choose the right one; selecting correct number of elevators of necessary size and capacity (with case examples worked out); budget pricing data; dimensioned layouts; installation information; safety features, and modernization of out-moded systems. Also explains advantages of company's protective maintenance agreement.. Elevator Div., Westinghouse Electric Corp.

103 **Reloving Carriage**—An accessory described as an extra pair of arms and hands for the one-man gang and available to fork-lift truck users is the revolving carriage introduced in Form AD-10, a data sheet. Tells how this accessory handles solid, liquid or granular bulk materials which must be transferred from one container to another; includes dimensions, specifications. Towmotor Corp.

104 **Short-Turning Hand Trucks**— New powered hand trucks are described and illustrated in color in this 12-pp booklet. Separate sections are devoted to both power types: the battery-powered and motor driven, and the gas-powered type driven by hydraulic pump and hydraulic motor. The center spread provides data concerning the mounting of the drive motors inside the drive wheel; the short turning radius; the frame and other units. Industrial Truck Div., Clark Equipment Co.

105 **Catalog on Hand Trucks**—Sixteen-pp Bulletin 29 illustrates and describes company's standard line of 2- and 4-wheel trucks, as well as trucks varying only slightly from standard models, and trucks designed to solve specific handling problems. Construction details of the entire line are covered, and dimensions, weights, capacities of all models listed. Lewis-Shepard Products, Inc.

106 **Single Drum Hoist**—Sixteen-pp Bulletin 76-X describes company's complete line of single-drum, portable multi-purpose hoists for industrial plants, mines, oil fields and construction work. Gives complete description and specifications for hoists with capacities from 500 to 3500 lb and driven by company's Turbinaire, Pistonaire, electric or gasoline engines. A selection chart is included. Joy Mfg. Co.

107 **Labor Savers**—Described in this bulletin are a 500-lb capacity multi-purpose electric hoist which can pull to 200 ft, an electric lift, and an electric carrier assembly with motor, trolley, cable and hooks. Includes specifications, prices for this equipment which has many applications in industrial plants. The Pinchbaugh Co.

108 **For Quicker Handling**— Hand trucks of many types, trailers, dollies and skids and casters and wheels are cataloged and illustrated in the 12-pp booklet. Full specifications and weights are included, as well as a discussion on construction features to look for when ordering materials handling equipment. Howe Scale Co.

109 **Ordering Guide for Casters**—Catalog CT-50, 36 pp, gives basic information on casters, helpful in selecting the correct size, type, capacity and material, according to intended use. Fully illustrated, includes specifications. Also provides data on several types of platform and hand trucks. The Rapids-Standard Co., Inc.

110 **Tool of All Work**—This circular describes the Pul-Lift, a link-chain hoisting device that's portable, sturdy, easily operated. Tells how the Pul-Lift works and some of the places you can use it. Gives full specifications, dimensions, capacities and prices. The Yale & Towne Mfg. Co.

111 **Ball-Bearing Idlers**—This bulletin describes and illustrates the company's New Departure troughing idlers for conveyor installations, explaining their advantages in terms of economy, smooth performance, reduced maintenance and longer belt life. Includes dimensions. The Conveyor Co.

112 **Drag Conveyors**—Eight-pp Bulletin DC describes and illustrates several types of drag conveyors for loading and stacking coal, giving general specifications, dimensions. Explains efficiency of radial storage method possible with company's radial stacking units. Conveyor Div., A. B. Farquhar Co.

113 **Protection for Truck Operators**— An accessory data sheet, Form AD describes, illustrates and gives dimensions on company's overhead guard for protecting lift truck operators a timber attachment ready for installation at the plant with bolts and clamps provided. Towmotor Corp.

114 **For Efficient Loading**— This bulletin describes and illustrates use of a welded steel transfer plate for installation in loading platforms. Shows how plate is easily adjusted to proper incline by two men. Stresses speed of car and truck loading operations and safety afforded. Gives specifications. Wm. Christensen Co., Inc.

VALVES, TRAPS, PIPING

115 **Corrosion Resistant Valves**—Bulletin SS100, 20 pp, describes globe, swing-check and gate valves for use in refineries, chemical and food processing plants and wherever corrosive media are handled, corrosive conditions involved, and product contamination must be held to a minimum. Besides specifications, includes photos and an interesting explanation of the types of corrosion and corrosion resistant alloys, also a table indicating general resistance of four alloys to 150 common corrosive agents. Pacific Valves, Inc.

116 **Swing Check Valves**—Form AD 1200 is an illustrated folder describing new brass swing check valves of the regrinding type with screwed or flanged ends. Discusses minimum flow resistance, positive closure on backflow, and easy servicing afforded by valves' simplified design. Gives recommended working pressures and directions for installing. Includes sizes, prices. Crane Co.

117 **Combination Valves**—Bulletin 1201 describes company's small-size valve designed for the three-fold function of automatically releasing air accumulation from systems, of admitting air to systems for breaking possible vacuums within them, and of venting large quantities of air when filling the system with water. Cutaway drawings show valve in open and closed position. Text explains operation. Discharge capacities, applications, dimensions, weights given. Simplex Valve & Meter Co.

118 **Blow-Off Valves**—Illustrated Bulletin B-433, 24 pp, describes blow-off valves for high-pressure boilers, and covers seatless, hard-seat and unit-tandem types, for working steam pressures from 600 to 2500 lb. Construction details and operating principles are illustrated by cutaway drawings. Dimensions and specifications included. Yarnall-Waring Co.

119 **Special Function Valves**—Unit. 149 describes valves for instrument piping and general use which combine unions, nipples, reducers, elbows, tees, valve and drain valve into one space-saving unit. Describes and illustrates design features and operation of the valves; lists types, sizes available, along with standard and optional features, ratings. Jerguson Gage & Valve Co.

120 **Float Traps**—Bulletin 950 gives complete specifications, capacities, pressures, sizes, and prices on company's D, F and Junior traps. These are widely used to drain condensate from steam equipment as well as moisture from air and gas equipment and information is given on these applications. Cross sections of float traps, air release valves, strainers and steam traps are shown. V. D. Anderson Co.

121 **Pulsation-Free Compressor Piping**—Illustrated Bulletin FDS-8501, 4 pp, describes company's pulsation dampening

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piping system designed for pulse-free performance. Tells how this piping is comparable in first cost to other piping, but affords higher operating efficiency, improved flow measurement and lower maintenance costs. Explains pulsation phenomena in gas compression systems and how pulsation dampening principle is applied. The Fluor Corp., Ltd.

ELECTRICAL

122 Improved Switchgear — Indoor and outdoor switchgear for better protection and flexible control of power and distribution circuits is described in 20-pp Bulletin 14B8B8A. Reference is included to indoor or outdoor types, with removable or stationary circuit breakers; switchboards of all types; replacement units; multi-circuit, single circuit and load center unit substations. Standardization advantages of metal-clad switchgear construction are given along with a table of space requirements for standard low-voltage switchgear. Allis-Chalmers Mfg. Co.

123 Electric Motor Lubrication Studies—Bulletin 1578, 4 pp, shows comparative amounts of lubricant in different designs of bearings and how bearings are subject to air circulation. Application of company's Lubrifloah principle is presented, showing how bearings can be lubricated for life and also can be purged of old lubricant and renewed without disturbing the bearing housing. U. S. Electrical Motors, Inc.

124 Disconnecting Switches—A complete line of indoor air-disconnecting switches is described in 8 pp booklet B-4725. Gives highlights on their design and operation, as well as application. Switches listed include five outdoor types and two indoor types. Hookstick operated switches for use when single-phase operation is permissible are covered. Other types described are for gang operation, with or without arcing horns, for interrupting small magnetizing and charging currents and for no-load applications. Rotating and tilting insulator types are also described. Westinghouse Electric Corp.

125 Low Speed Synchronous Motors—Bulletin 44-200 is devoted to custom-built low speed synchronous motors available in ratings of 20 hp and larger, to 450 rpm, with bracket, pedestal or engine type construction. Advantages of special design features are illustrated and explained. Also illustrated are vertical type synchronous motors. The Electric Products Co.

126 Air Break Contactor—Eight-pp Bulletin 14B7303 introduces a new high voltage air break contactor of compact design which is interchangeable with company's oil immersed contactors. Emphasizes adaptability for heavy duty jobs, simplified construction and double break contacts used. Also describes and illustrates other features including dual blowout structure, special arc chutes. Dimensions, ratings provided. Allis-Chalmers Mfg. Co.

127 The Why of Dry Type Transformers—Booklet B-4421, 24 pp, discusses reasons why dry-type transformers are safer and less expensive to install and maintain in industrial plants and utilities. Types of air-cooled transformers for every use are illustrated from small ones for operation of intercommunication systems to power centers as large as 10,000 kva. Also describes sealed, submersible, dry-type transformers for installation underground. Westinghouse Electric Corp.

128 Motor Generator Sets — Eight-pp Booklet GEA-3500 covers motor-generator sets from 20 to 5000 kw as a source of d-c power for many industrial applications, such as rolling-mill motors and other drives, electrolytic refining of ores, excitation for synchronous and d-c motors and generators, large testing equipment and general purpose use. Well illustrated, booklet shows four typical installations and describes construction features of the motors and generators. Ratings of motors included are 60, 50 and 25 cycles, 0.8 pf, 220 to 13,200 v. Generators are rated at 125, 230 and 600 v. General Electric Co.

129 Induction Motors—Construction features of large two-pole squirrel cage induction motors are given in Bulletin 05B7550, 6 pp. A sectional view of a typical normal torque, low starting current motor shows stator winding, bearings, ventilation, squirrel cage winding, rotor, stator, and bearing brackets; photos show motors and parts. Construction features described are available in company's standard 40 C rise continuous rated, two-pole, 60-cycle, 3600-rpm bracket-bearing squirrel-cage motors for direct-connected drives in all ratings 200 hp and larger for boiler feed pumps, oil pipeline pumps, centrifugal blowers, descaling pumps. Allis-Chalmers Mfg. Co.

MAINTENANCE AND CONSTRUCTION

130 What to Do about Masonry Surfaces—If the protection of masonry surfaces is one of your problems you'll want this illustrated folder. Describes a heavy paste for protecting and preserving masonry surfaces and for plaster-bonding over masonry. Tells how to use this coating, gives coverage, shipping units. Covers use on outside foundation walls, floors, roofs, stacks, other outside surfaces. Flexrock Co.

131 Construction Data Hand Book—This 100-pp, pocket-sized booklet is packed with both product information and application data. It covers caulking and glazing compounds, floor materials, interior and exterior paints and coatings, roofings, waterproofing, dampproofings. An extremely helpful manual, it tells how and where each product should be used, how much is needed, and how it's packaged. Includes some worthwhile engineering information pertaining to the use of these and other materials. A. C. Horn Co., Inc.

132 For Safe Floors — This illustrated folder describes an abrasive, composition material for use on concrete, metal or wood surfaces to make them slip-resistant. Includes illustrated, step-by-step directions for use. Walter G. Legge Co., Inc.

133 Rugged Flooring—Bulletin 80, 24 pp, describes an emery aggregate for use with cement and water to make floors that stand abusive treatment. Discusses properties of the emery aggregate, citing test results and giving its special advantages in flooring applications. Shows how this flooring is laid, where it's recommended for use, and pictures some installations. Walter Maguire Co., Inc.

134 Which Scaffolding?—Form P.S. 19, 8 pp, describes both free standing scaffold jacks and tubular sectional scaffolding, explaining and illustrating the advantages and applications of both. Illustrates construction features, equipment in use. Also describes a swinging stage. Wilson-Albrecht Co., Inc.

135 Bins with the Strength of Pillars—This illustrated folder describes storage bins constructed of diagonal-ended super-strength concrete staves reinforced with galvanized steel rods around the walls. Names 26 flowable bulk materials which may be handled in these bins, which can also be used as cooling towers, dryer housings, dust bins, mixing tanks. Data tables show capacities of the bins in bushels, cubic feet and tons. Photos of typical installations included. The Neff & Fry Co.

INSTRUMENTS AND CONTROLS

136 Regulator Data — Form 1003, 4 pp, gives useful information on temperature regulators, pressure regulators, and desuperheaters. A complete explanation of the principles of pilot-operated regulating valves is included in addition to data and illustrations of 27 pilots. Spence Engineering Co., Inc.

137 Panel Space Saver—This 8-pp bulletin presents company's Transet recorder designed for recording process information right on graphic or conventional panels without addition of wings. Describes models available and special features, also an indicator for applications where a continuous record is not required. Includes circuit diagram for both instruments covering use with controller located in control house or in other locations. Taylor Instrument Companies.

138 Time Saving Volt-Ammeter—Manual 110, 16 pp, is titled, "How to Make Your Job Easier with the Amprobe," and describes the handiness of this pocket-size volt-ammeter in installing, repairing, servicing and maintenance of electrical equipment. Also tells some of the many jobs on which this lightweight instrument can save time and trouble and explains how to use it and read the scales. Pyramid Instrument Corp.

139 Dairy Instruments—A complete line of recording instruments for dairy industries is illustrated in 12-pp Catalog 1140B, giving specifications and performance details of recording thermometers and pressure gages. Also carries descriptive listings of sanitary bulbs and fittings, dairy charts, other related indicating and recording instruments for temperature and pressure. Tagliabue Instruments Div., Weston Electrical Instrument Corp.

140 Window Units at Work—Bulletin 4D shows new and varied applications of company's one-piece window units for indicating liquid level, flow, drip, or movement of internal parts. This unit is flush mounted by press fit. Uses developed by designers to solve both everyday and special problems are described. Eljur Lubricating Corp.

141 Thermocouple Manual — This is a new 42-pp edition of company's data book and catalog containing current prices, application recommendations and other information on instrument sensing units and

(Continued on page 161)

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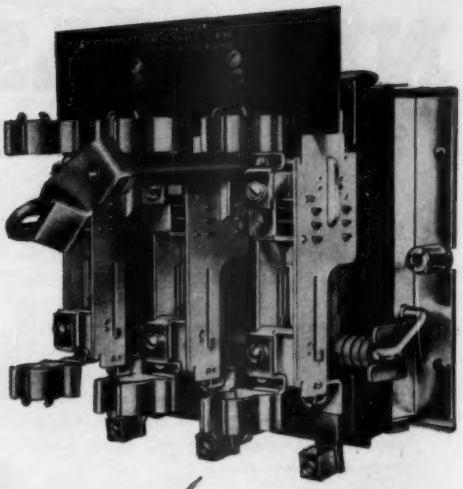

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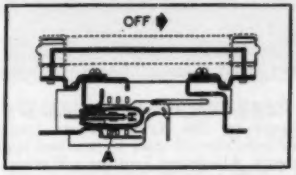
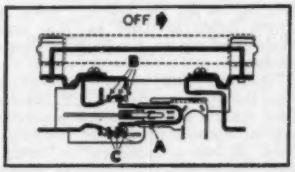
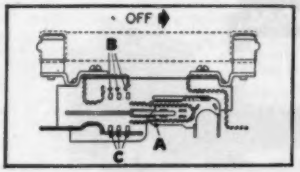


1. Switch closed. Spring-loaded sliding contact (A) fully inserted between stationary contacts. Heavy line is current.



2. Sliding contact being withdrawn. The two arcs repel each other, are drawn against grid pins (B) and (C), which break and cool them.



3. Contact fully withdrawn. Trumbull's unique "Circuit-Breaker" action has effectively extinguished the arcs.

CHECK THESE ADDITIONAL SPACE-SAVING, TROUBLE-PREVENTING, LIFE-LENGTHENING FEATURES

Center-front operation permits close ganging.

Front fusing allows compact box, yet gives ample wiring space.

No exposed live parts when switch is OFF and door is open.

Handle interlock.

Clear ON and OFF markings both inside and outside.

No dead center—roller-cam action (multiplying linkage design with powerful spring) throws switch to full OFF and ON.

Poles are self-contained switching units for easy replacement.

Silver-plated current-carrying parts prevent oxidation . . . give low-resistance contact.

Insulating parts made of linen melamene, light, strong, arc-resisting.

Enclosed operating mechanism (on 60- and 100-amp. sizes) prevents wire chafing.

Interior removable for wiring ease.

Underwriters' approval throughout.

For more information about Trumbull's all-new HCI Safety Switch, write for your free copy of Bulletin TEC-10 today. THE TRUMBULL ELECTRIC MANUFACTURING COMPANY, Plainville, Connecticut.

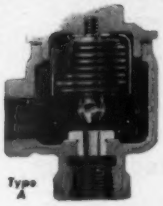
Men Who Observe the Best Electrical Practice Make It a Practice to Use

TRUMBULL (T) ELECTRIC

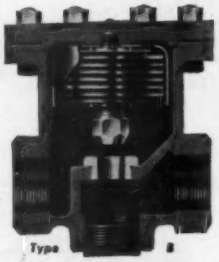
TRUMBULL'S TRAINLOAD OF NEW PRODUCTS

PERFORMANCE RECORDS POSITIVELY SHOW YOU CAN PROMOTE EFFICIENCY
with

NICHOLSON
STEAM TRAPS

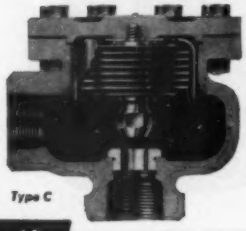

Type A

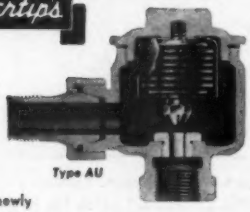
The straight findings of plant engineers is, in most cases, the reason for the increase in the number of important firms which have recently standardized on Nicholson thermostatic steam traps for specified applications. For instance, in 15 out of 20 plants of a large processing firm the plant engineers chose Nicholson as their preference. With steam costs constantly on the rise, your nearest Nicholson engineer will gladly help you check your steam trap performance.


Type B

5 Types for Every Process, Heat or Power Application

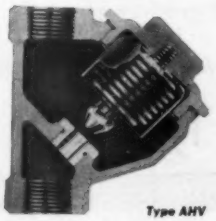
Sizes ¼" to 2"; any pressure to 225 lbs. without changing or adjusting valve.


Type C


Type AU

Send for CATALOG 250

A standard reference on drainage methods; newly revised. Describes traps for all mediums: thermostatic and metal expansion for medium pressures; weight and piston operated for heavy duty. 32 pages; capacity tables, installation diagrams; data, charts and formulae for determining proper size trap.


Type AHV

W. H. NICHOLSON & CO.

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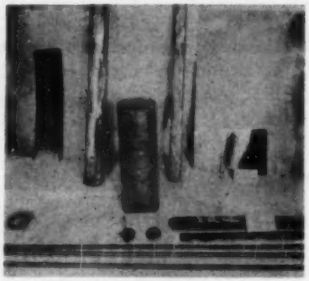
Sales and Engineering Offices in 53 Principal Cities

(Continued from page 16)

the cooperative venture of National Lead Co. and Allegheny Ludlum Steel Corp. linking facilities to form Titanium Metals Corp. of America.

The companies are ever on the watch for new and improved methods of producing this wonder metal in large tonnages and at a price competitive to other structural metals. Molten titanium was one of the problems overcome. Titanium was difficult to handle and keep pure in its molten state because it is so strongly reactive that it eats into most melting vessels and quickly combines with oxygen if exposed to air. This problem has been solved by using electric arcs in water cooled copper cylinders. Molten titanium does not wet cold copper and no contamination results from the contact with furnace walls.



Various forms of titanium being produced for commercial use. Properties: light, strong, resists corrosion

The porous titanium sponge produced by the Kroll process must, for commercial use, be melted into ingots. Allegheny Ludlum's Watervliet mill is casting 500 lb titanium ingots from this sponge. Other plants are rolling, forging and drawing the new metal into commercial forms: titanium strip is being rolled down to 0.001 in.; sheets are being made in sizes up to 53 by 130 in.; wire is drawn down to 0.003 in. dia; and forgings of up to 400 lb have been produced.

Titanium has many interesting miscellaneous properties. It marks glass with a gray streak, a practical way of identifying it from stainless steel. It has a tendency to "seize" many materials and it wears white, a property that may make it valuable for textile machinery parts where staining cannot be tolerated.

Because of its high resistance to salt water corrosion, it has a bright future for piping systems, pumps, propellers and water lubricated bearings and shafts. The oil industry could use it in wells. Titanium pipe for a 20,000 ft well would be as strong but would be equivalent in weight to less than 12,000 ft of steel pipe. *From Steel Horizons, a publication of Allegheny Ludlum Steel Corp., Pittsburgh 22, Penna.*

PROVE TO YOURSELF!! WHY "VISUAL" 3-DIMENSIONAL PLANNING IS SUPPLANTING ANTIQUATED TEMPLET LAYOUTS IN TOP CONCERNS

To demonstrate—clearly, concisely and inexpensively—the advantages gained through the use of 3-dimensional planning—"Visual" Planning Equipment Co., Inc. has developed an experimental 3-dimensional planning kit in exact ¼"-scale. It is priced at cost in order to make it available to every layout engineer.

This kit is designed for the express purpose of demonstrating the values of 3-dimensional planning in all its aspects—and its superiority over other methods of laying out space. Though it cannot be applied to any specific manufacturing plant, the wealth of material contained in this kit provides you with the tool that will enable you to *find out for yourself* the many benefits gained through the use of this progressive type of planning. There is sufficient material included in this kit to demonstrate, within restricted limits, the 3-dimensional answer to almost any type of plant problem.

The kit consists of 209 ¼"-scale "Visual" models, plus planning board, columns and tape. The individual pieces in the kit are—

- 2 Drill Presses
- 2 Punch Presses, floor type
- 2 Pedestal Grinders
- 1 Bench Lathe on stand
- 2 Milling Machines
- 2 Production Lathes
- 1 Turret Lathe
- 1 Double Grinder
- 1 Universal Grinder
- 1 Do All Saw
- 1 Automatic Lathe
- 15 Shop Tables
- 10 Workbenches
- 1 Towmotor
- 2 Shop Trucks
- 6 Sections of straight conveyor
- 2 Sections of curved conveyor
- 10 Pallets — Empty
- 10 Pallets — Loaded
- 40 Assorted Operators, Male and female
- 30 Tote Boxes — 10 each of 3 sizes
- 1 Foreman's Desk
- 5 Shop Cabinets
- 10 Barrels
- 5 Shelving Units
- 5 Tubs
- 5 Vises
- 5 Bench Lathes
- 5 Microscopes
- 6 Assorted Desks
- 6 Files
- 1 Drinking Fountain
- 1 Set of Toilet Equipment
- 1 Adding Machine
- 6 Telephones
- 3 Typewriters

(All the above are finished in full color.) PLUS the Following:—

- 1 Scored (¼" graph) Lucite layout board — 12" x 18"
- 6 Columns
- 2 Rolls of "Visual" layout tape

Price $97.50, F.O.B. Oakmont, Pa.

With "Visual's" experimental layout kit you can prove to yourself—as well as your colleagues—that 3-dimensional planning will (or will not)

1. Save time.
2. Save money.
3. Provide a common language for the discussion of plant and process problems.
4. Secure quick, accurate decisions.
5. Permit everyone to contribute suggestions and participate in plant projects.

Obviously, because of the extreme reduction in price, no substitutions or additions can be permitted.

Note—We will credit the purchase price of this kit toward your first departmental or plant order.

"VISUAL"

Buy It — Use It Experimentally — Decide — 300 top American industries can't be wrong . . . "Visual" saves time — saves money.

PLANNING EQUIPMENT CO., INC.

PENNSYLVANIA AVENUE AT RIVER, OAKMONT, ALLEGHENY COUNTY, PA.

2-WAY CHOICE of operating method greatly increases utility of Ramset Dual-Action Tool for instantaneous fastening into steel or concrete — with just a TURN... or a TAP.

ALL-STEEL CONSTRUCTION, of extra thick, precision machined, aircraft quality steel, adds years of economical, dependable performance.

NEW ROTO-SET SAFETY SHIELD adjusts in ten seconds to any of seven positions; permits easiest, most accurate positioning of fasteners.

FASTER, EASIER FASTENING

with improved Ramset Dual-Action

FASTENING SYSTEM

You'll be time and money ahead, using RAMSET SYSTEM for fastening work in steel, concrete, masonry. Cutting time by as much as 90%, and costs by as much as 75%, RAMSET pays big dividends to thousands of users. With the improved RAMSET DUAL-ACTION TOOL, benefits are greater than ever before.

Ask for demonstration on your own work

Your local Ramset Specialist will *"Ramset"* a sample job for you, without cost or obligation. He'll show you the wide line of RAMSET FASTENERS, engineered to meet your most exacting needs. He'll prove Ramset's economy, speed and convenience on tough or easy fastening jobs. And, he'll help you find the surest, fastest, lowest-cost methods of doing especially unusual work. Ask for details and proof. *Ramset Fasteners, Inc., 12117 Berea Road, Cleveland 11, Ohio.*

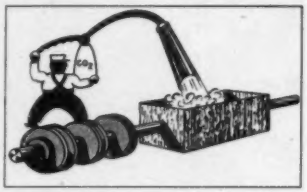
Ramset Fastening System

Pioneer in powder-actuated fastening

Snow Simplified Job

A MECHANIC's ingenuity and snow solved a tough maintenance problem at the Gas City plant of Owens Illinois Glass Co. The mechanic was installing a collector ring on a rotor of a wound rotor motor. It was found that the fit was so tight that the press was unable to move the ring beyond a certain point.

This problem was solved by fitting a cardboard carton around the shaft



Carbon dioxide discharged into carton simplified job of inserting ring on shaft

where the ring should fit, leaving about three inches clearance between the shaft and the carton. The carton was left open at the top. Then an 18 in. carbon dioxide fire extinguisher was discharged into the carton around the shaft, and the carton caught and held the resulting snow. After a short period of time, the snow and carton were removed. The ring was then slipped into place by hand.

The same end result could have been obtained by packing the carton with dry ice, but the extinguisher was far more convenient on this particular job. The only cost for special equipment was a three dollar fee for recharging the extinguisher. *From an article by Lawrence Colyer, in Maintenance News, a publication of Westinghouse Electric Corp., East Pittsburgh, Penna.*

Make Way for Safety!

THE DERRICKMAN, high above the ground on the working platform, turned quickly from his work. He

Slide offers safe means of escape

Like this record of low-cost maintenance?

make it yours
with dependable quality

CRANE VALVES

No. 960 Crane Brass Pressure Regulator for steam or air. Literature on request through your Crane Branch or Crane Wholesaler.

A CASE HISTORY FROM CRANE FILES

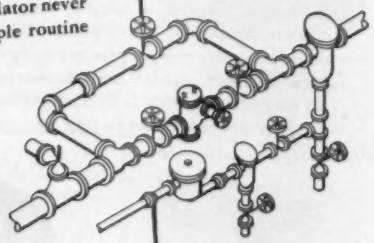
PROBLEM: To choose a pressure regulator that would assure a steady, unvarying steam supply to cooking kettle for an exacting brewing process.

WORKING CONDITIONS: Regulator subject to continuous operation 24 hours per day. Main steam supply at 100 psi to be constantly reduced and maintained at 30 psi.

SOLUTION: Crane No. 960 Brass Pressure Regulator. (*Former model with integral non-renewable cylinder.*)

RESULT: For 16 years, throughout its lifetime, the Crane 960 Regulator never failed, never faltered, never required more than prescribed simple routine servicing.

Replaced with new Model 960 Crane Pressure Regulator. With all wearing parts renewable, it will virtually never wear out. Now in service 18 months; operating cost: zero.

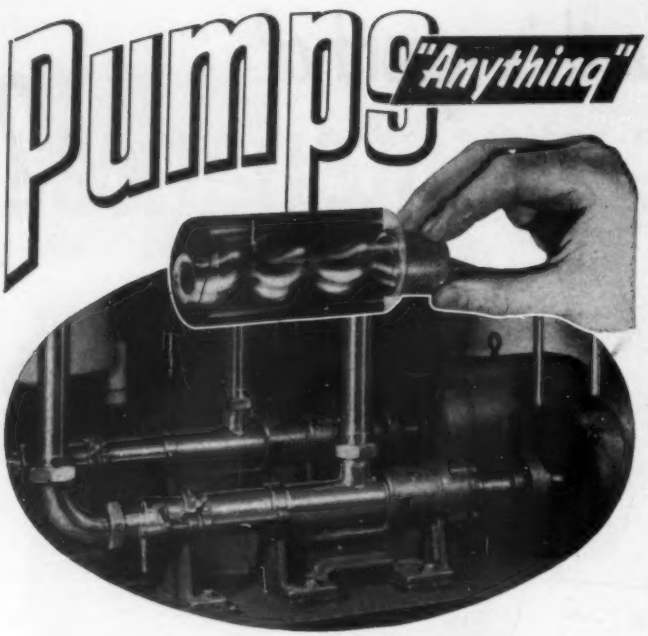


A typical example of the long life and low-cost maintenance that make Crane Quality the best value in all types of valves. That's why...
More CRANE VALVES are used than any other make

CRANE

CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING



See How Simply You Can Solve YOUR PUMPING PROBLEMS

Do you want to pump tooth paste, clay slip, *diamond dust in oil* . . . hamburger, salt water, gasoline or glue? Possibly not. But the chances are that somewhere about your plant there's a pumping job you could do *better and cheaper* with amazing R & M Moynos. Pumps above deliver a high-viscosity food product to packaging machines. They're a special Moyno type for edibles—may be quickly dismantled for cleaning. Like all Moynos, they self-prime; deliver steady, *positive pressure* without turbulence . . . have no pistons or valves, and but a single moving part. Moynos are made for all services. Thousands in use. Tell us what *you* want to pump. Let us show you what *Moynos* can do.

R & M MOYNO® PROGRESSING-CAVITY PUMP

WRITE FOR THIS FREE LITERATURE. Moyno Food Pumps, Form P-3077-E; Moynos for Ceramics, Bulletin P-32-E; Moynos for other services, Bulletin P-30-E. Moynos resist abrasives and chemicals; deliver pressures to 1000 p. s. i.; stand up where *other pumps* fail. Get the facts today.

ROBBINS & MYERS • INC.

SPRINGFIELD 99, OHIO • BRANTFORD, ONTARIO

MOTORS • HOISTS • CRANES • FANS • MOYNO PUMPS

ran to the edge of the "run around" and hopped into a metal seat suspended from a manila rope. Immediately he began to slide down and out away from the derrick toward the ground.

The derrickman was using one of the latest and most modern of a series of slides which have been invented and installed on Standard Oil Co. derricks in an attempt to provide a rapid and safe means of emergency escape for the men working high on the derrick.

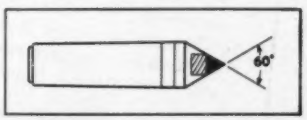
The Launder Safety Slide is simply a tractor-like seat suspended from a metal cylinder which slides over a one-inch manila line. In use, one end of the rope is tied to the derrick, just above the outside platform, and the other end is anchored to the ground. A handy brake lever is attached to give the rider complete control over his speed. Even on a nearly vertical descent, the ride is a safe one. *From The Standard Oiler, a publication of Standard Oil Co. of California, San Francisco 20, Calif.*

Extend Life of Carbide Centers

THE LIFE OF carbide centers between reconditioning should be about 50 to 100 times that of softer centers on the average installation. To assure such performance, correct design of the center and proper maintenance are important.

That portion of the center carrying the load should have as close to 100 per cent bearing surface as possible. Further, when doing high precision turning or grinding, lapping the female centers of the work piece is desirable to assure maximum bearing surface.

Another design factor is the depth to which the carbide tips are set into the steel shanks. This should be great enough so that the tips can be



Depth of carbide centers should be great enough so that tips can be reconditioned by grinding back on original angles, keeping maximum tip diameter

reconditioned when worn by grinding back on the original angles without reducing the maximum tip diameter.

To refinish a carbide tipped center, the center can be mounted in the work head of either a cylindrical grinder or a tool and cutter grinder, in the same manner that steel centers are set for reconditioning.

The carbide center is then slowly rotated and ground at the same time with a 220 grit diamond wheel. Unless the carbide tip is badly scored or chipped, it should not be necessary to remove more than 0.002 to

TROUBLEMAKERS . . . CHECKED OUT OF PLANTS USING THE

CASH STANDARD *Streamlined* PRESSURE REDUCING VALVE TYPE 1000

. . . . it's done because of

BENEFITS THAT FOLLOW INSTALLATION . . .

Below is shown 10 benefits obtainable with the CASH STANDARD Type "1000" Streamlined Pressure Reducing Valve. Statements from a few of the many letters we receive from users are listed. Each gives the number of benefits realized. Check the letter preceding each statement against the corresponding letters in the chart.

A A Maintenance Engineer checks 7 of the points and says, "We have experienced excellent results."

B A Tire Company in checking 10 points says, "We wouldn't hesitate a minute in recommending the '1000'."

C A Maintenance Engineer checks 10 of the points and says, "We use the '1000' under very adverse conditions and find it perfect in every way."

D A Mill Supply Company checks 6 of the points and says, "Said valves can be throttled to practically zero from pressure set at."

E A Manufacturer checks 7 of the points and says, "We have found the '1000' to be a very good pressure controller in every way."

F A Maintenance Engineer checks 8 of the points and says, "If we had more places to use Type '1000' I would insist on using them."

A B C D E	**POINT No. 1** Maximum capacity when needed most.
A B C D E F	**POINT No. 2** Accurate pressure control under toughest working conditions.
A B C E F	**POINT No. 3** Trouble-free service.
A B C D E F	**POINT No. 4** Smooth operation.
B C E F	**POINT No. 5** Tight closure.
B C D	**POINT No. 6** Speedier production results.
A B C E F	**POINT No. 7** Elimination of failures.
B C D F	**POINT No. 8** Cost-saving operation.
A B C F	**POINT No. 9** No spoilage.
A B C D E F	**POINT No. 10** Practically zero in maintenance.

CASH STANDARD CONTROLS.. VALVES

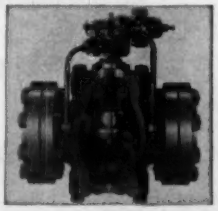
Send FOR BULLETIN 962

A. W. CASH COMPANY
DECATUR, ILLINOIS

BULLETINS AVAILABLE ON OTHER CASH STANDARD VALVES
Send for them

Bulletin 950—features the CASH STANDARD Type D Single Seat Pressure Reducing and Regulating Valves for use with most fluids. Shows simple inner working parts that save in maintenance. Diagram explains how valve works. Blueprint shows simplicity of installation.

Bulletin 956—features the CASH STANDARD Type 4030 Back Pressure Valve — designed to automatically maintain a constant pressure in the evaporator corresponding to a constant temperature desired. Shows an Ammonia and Freon Gas Capacity Chart based on ABSOLUTE pressures.



Bulletin 966—features the CASH STANDARD Self-Contained, Pilot Operated Type 10 Pressure Reducing and Regulating Valve for use with water or air; with any gas or oil that is non-corrosive; and with refrigerating fluids such as Ammonia and Freon. Many interesting particulars explained such as: how valve works, tight seating, large capacity, no waste, no water hammer or chatter.

puttin's a breeze . . .
his mind's at ease

Yes sir, here's a chap that can really concentrate on a putt! He knows that a flash fire can't stop production at his plant . . . equipment, materials, buildings, and the lives of employees are fully protected with modern, approved C-O-TWO Fire Protection Equipment.

You, too, can have this same ease of mind about your factory, mill, warehouse, power station or research center. There are fire hazardous areas that particularly need C-O-TWO fast, positive fire protection: spray booths, dip tanks, solvent baths, electrical equipment enclosures, mixing vats, storage tanks, pump rooms, record vaults, store rooms, especially anywhere there's danger of flammable liquid or electrical fires. At many locations a C-O-TWO Combination Smoke Detecting and Fire Extinguishing System is a "must". The first trace of smoke in a protected area sounds an alarm . . . then fast, clean, non-damaging, non-conducting carbon dioxide blankets the fire, putting it out in seconds, before it spreads and causes extensive damage . . . no lingering odors, no water damage with carbon dioxide.

So, whatever your fire protection problem, let an expert C-O-TWO Fire Protection Engineer help you in planning complete and up-to-date fire protection facilities now. Write us today . . . tell us about your particular fire hazards, our experience is at your disposal . . . there is no obligation of course.

C-O-TWO

C-O-TWO FIRE EQUIPMENT COMPANY

NEWARK 1 • NEW JERSEY

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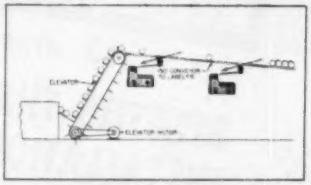
Squeez-Grip Carbon Dioxide Type Fire Extinguishers • Dry Chemical Type Fire Extinguishers
Built-In High Pressure and Low Pressure Carbon Dioxide Type Fire Extinguishing Systems
Built-In Smoke and Heat Fire Detecting Systems

0.010 in. of carbide metal. If the work is such that the grind marks must be removed from the lathe center's tip, the carbide can be lapped. After the tip has been ground, its sharp point should be dubbed off or broken slightly with either a diamond or a silicon carbide hand hone. The steel portion of the conical tip should be ground with an aluminum oxide wheel. *From a news release of Carboloy Co., Inc., Detroit 32, Mich.*

Check Conveyor Jams

HERE IS AN excellent means of controlling jams on a gravity conveyor. Two snap-action switches were placed three feet apart on a gravity can conveyor. The closed sides of the snap-action switches were connected in series to a warning signal bell. Both switches will be open simultaneously only when the gravity



Two snap-action switches are placed on gravity can conveyor which sound warning bell should the conveyor jam

conveyor is jammed; therefore the motor is kept running and the signal does not ring every time one can rolls by.

Before the snap-action switches were put on the job, much material was lost, and often the machinery was damaged by jams which were not discovered until it was too late. *From an article by John L. Higgins, in Micro Tips, a publication of Micro Switch, Freeport, Illinois.*

Flammable Adhesive Requires Proper Storage

FAILURE TO recognize the great fire hazard in highly flammable viscous adhesive led to a fire at a paper plant which only chance kept from involving extreme loss.

The adhesive, representing many months' supply for the plant, was kept in two drums within a few feet of an automatic gas-fired hot water heater. When some of it was spilled by an employee, drawing it off into a glass bottle for use at work tables, the vapors were ignited by the open gas pilot on the heater.

A self-closing faucet and the nearly tight bung cap prevented spread of the fire to the drum, but many valuable prints and paper specialties, plus several million envelopes stored on the floor below were destroyed either by the fire or by water from the sprinklers which extinguished the fire. This fire might easily have

"Job-Engineered"
means tailored to your crane needs

When you buy a crane, you want dependable service for many years to come. Your P&H "Job Engineered" crane will be built to meet your requirements to insure dependability . . . ample reserve capacity . . . adequate service factor . . . maximum safety. All P&H electrical equipment is designed and built by P&H for crane service — not adapted for it.

"Job Engineered" is an Added Value which comes with P&H's 65-year experience in crane-building — to serve your needs *exactly*.

And here's a fact worth remembering: P&H Cranes are sold and serviced by factory-trained men — not agents.

P&H Magnetorque* is the greatest advancement in AC crane control in the past 40 years. Ask about it.

*T. M. of Harnischfeger Corporation for electro-magnetic type brake.

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Write for your copy of Bulletin C-39 describing P&H Magnetorque control.

OVER 17,000 P&H CRANES SERVE AMERICAN INDUSTRY . . . FAR MORE THAN ANY OTHER

Big steel Mill saves:

6 hours of down time

plus 12 man-hours on each routine roller-journal overhaul

using Snap-on* IMPACT SOCKETS and EXTENSIONS

Saving six hours of production time of a hot-broach unit in one of the largest mid-west steel mills undoubtedly earns enough money to buy many a set of Snap-on Heavy-Duty Impact Sockets!

Add 12 man-hours of skilled maintenance mechanics' time and you've got a savings total to gladden the heart of any cost-worried works manager.

This job demands removal of 16 bolts on each roller. For years it's been a slow, sledge-wrench job, averaging 8 hours apiece for two workers. Today, using a 1½" drive impact gun, with Snap-on Impact Sockets and Extensions, the job is done in 4 hours.

Such savings are frequent among Snap-on users. Snap-on's nation-wide tool service—backed by 30 years' experience in tooling every type of industry for production, assembly and maintenance operations—is your assurance of the best obtainable tools for your needs. Write for catalogs and address of nearest Snap-on branch.

Write for industrial catalog and 104-page general catalog!

*Snap-on is the trademark of Snap-on Tools Corporation.

SNAP-ON TOOLS CORPORATION
8068-A 28TH AVENUE
KENOSHA, WISCONSIN

resulted in much greater damage to buildings and stock as well as personnel, had the drums exploded.

A standard flammable liquid vault having adequate fire safeguards, and located apart from other valuable storage, was suggested. Only small quantities of the adhesive, in safety cans, should be kept on the premises. *From Factory Mutual Record, a publication of Factory Mutual Engineering Div., Boston 10, Mass.*

How 40,000 People Keep Warm

A CENTRALIZED heating system serving the homes of 40,000 persons but controlled and regulated from one room no larger than a good-sized closet is getting its first tryout in New York City.

By pressing the switches on a large instrument panel, the operator is linked within a matter of seconds to each one of 51 apartment units. Within eight minutes, and by moving only a few steps, he can check the temperatures in each and all of the 51 buildings having a total of 12,272 apartments.

From the boiler room to each house provided with a semi-automatic heating panel, only two wires are required to perform the following functions: control the vacuum pump, open or close the main steam control valve to any degree, connect or disconnect the semi-automatic heating panel and throw it to manual, day or compensator control. A second two wires are required to make it possible to read steam temperatures in each house at the main central control panel. *From Brown Recorder, a publication of Minneapolis-Honeywell Regulator Co., Brown Instruments Div., Philadelphia 44, Penna.*

This panel of remote indicators, an alarm and controls provides 40,000 persons with warm winter living comforts

Idle Boilers Require Attention

CONSIDERABLE HAVOC and deterioration of equipment takes place during periods of idleness. This applies with equal force to steam boilers as much as to other equipment.

Water in a boiler can be corrosive, and prolonged contact with the steel of which it is fabricated can cause considerable loss of metal. This is especially true of a boiler that is cold

Metallurgy

Craftsmanship

Tolerance Control

8 REASONS WHY SKF IS PREFERRED BY ALL INDUSTRY

Integrity

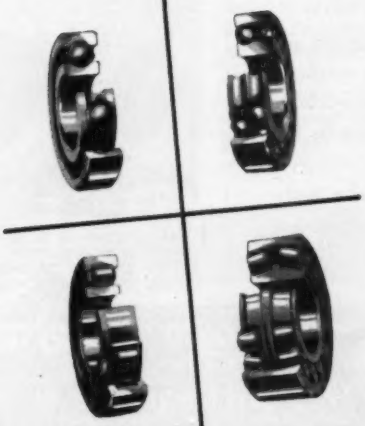
Product Uniformity

Field Service

Engineering Service

Surface Finish

make preference for a reason your guide when you specify ball and roller bearings



Over the years, products acquire a value above and beyond their mechanical qualities—a value proved by their *acceptance* throughout industry. This is especially true of SKF ball and roller bearings, preferred by all industry for one or more of eight good reasons. So when you specify, let preference be your guide. 7200

SKF
BALL AND ROLLER BEARINGS

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.
—*manufacturers of* SKF *and* HESS-BRIGHT *bearings.*

DARTS

Are Your Best Buy!

Because You Can Use Them

OVER AND OVER AGAIN!

Both the bronze seats in a Dart union are precision ground to form a true ball joint. As a result, a Dart tightens easily — gives a drop tight joint without excessive wrenching. Seats stay unmarred — ready for use again and again.

What's more, they're protected by a body and nut of *practically indestructible* air refined, high-test malleable iron — another long-life feature.

Because they are made stronger, better, you'll find Darts are *always* your best buy.

E. M. DART MFG. CO.
Providence 5, Rhode Island

DART
UNIONS

because cold water dissolves oxygen and oxygen accelerates corrosion.

Here are some simple precautionary and protective measures which should be taken when laying up a boiler: 1. To the water in the boiler add a suitable water treatment to combat the elements of corrosion effectively. This is best done while the water is still warm so the convection currents will distribute the treatment throughout the water. 2. Fill the boiler full of water to eliminate the air space. 3. If equipped with a main steam valve, it should be closed. 4. Remove ashes from pits and grate, remove soot from flues and tubes. Washing the tubes with alkaline water is effective. 5. Allow fireside to air dry thoroughly. 6. Spread burnt lime on pans placed on tubes and in combustion chamber and on grates. Lime absorbs moisture in the air and prevents sweating. 7. Close all dampers, doors, ports and openings.

Additional precautions can be taken by covering exterior of tubes and flues with metal protective coating. The use of refractory coating after patching faulty brick work is also advised. *From Metrol, a publication of Metrol Co., Detroit 2, Michigan.*

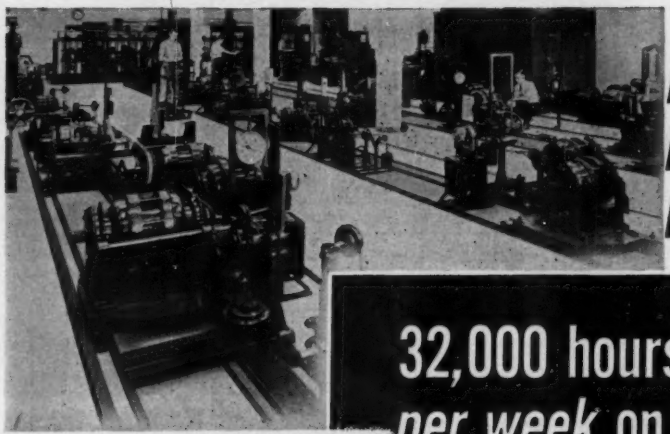
Look! No Wires! It's Done with Reflectors

THESE DISCS, 6 ft in diameter, help speed messages at Detroit Edison Co. without the aid of wires. The two parabolic reflectors have been recently bolted to the top of the general offices and another pair are on the roof at the Trenton Channel power plant, a distance of 16 miles.

The aluminum discs serve as reflectors to produce a highly concentrated radio beam. Radio transmitters and receivers are connected to small antennae in the center of the discs.

Discs separated by 16 miles carry voice conversations and make available additional channels for handling and operating instructions, remote metering

Several voice conversations—as well as signaling and remote metering—can be carried between the general offices' nerve center and the men who operate Trenton Channel. *From Synchroscope, a publication of The Detroit Edison Co., Detroit 26, Mich.*



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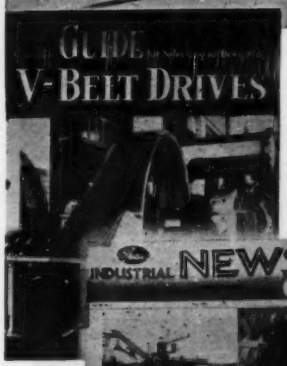
32,000 hours of testing *per week* on V-Belts alone!

In Gates V-Belt testing laboratories, which are by far the largest in the world, we run *32,000 hours of testing per week* on V-Belts alone. Thats' the equivalent of *5 years of continuous service* for one belt—*all in a single week!*

This intensely *Specialized* Research on V-Belts has naturally given Gates Engineers a knowledge of V-Belts and V-Belt drive design that is truly unusual—and it is this specialized knowledge that is embodied in the Gates "GUIDE for SELECTING or DESIGNING V-BELT DRIVES."



Take Advantage of this Great Store of V-Belt Knowledge—FREE!

The GUIDE is widely recognized as the most comprehensive and complete book of its kind—as well as the *easiest to use*—and it is *yours for the asking!*

Another Gates publication, the "INDUSTRIAL NEWS," published monthly, brings you the case histories of actual V-Belt Drives that have been designed and used by practical operating men or by plant engineers—reporting all that is new and progressive in V-Belt drive practice.

Whether you are a practical operating man or a design engineer, you can save much time, hard work and money by having these very useful Gates publications. They are entirely free—are sent to you without the slightest obligation. Just mail the coupon below—today!

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ENG-907

MAINTENANCE & OPERATION

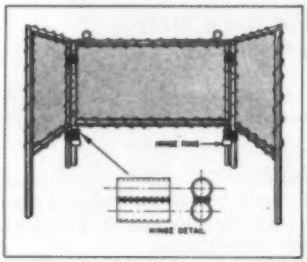
of buildings, utilities and facilities

Portable Welding Booth

Contributed by Fred G. Hess, Asst. Plant Engr., Camden Forge Co.

TWO ELECTRIC welding machines are used by the company to take care of welding jobs at various locations in the plant. For safety purposes, the plant safety committee asked that the electric welding be performed in shielded areas so that machine hands and crane operators would not be exposed to the dangers of the welding arc.

A portable welding booth was designed to answer the need. Essentially, it is an all-welded frame of uniform dimensions made up of one inch pipe with 4 hinge rings. The hinge rings are 1¼ in. pipe ½ in. long and are tack welded to the frame, beneath the hinges. The folding feature is accomplished by 4 hinges made of 1¼ in. pipe. The hinges are 4 in. long and welded lengthwise, as indicated in sketch. Fire-resistant curtains latticed to



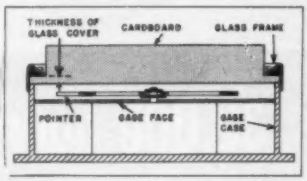
Welding booth offers easy maneuverability and provides shielded area for necessary welding jobs about the plant

the three frames shield the working area. An additional curtain is placed over the top. Two eyes are welded to the top center panel for easy crane handling.

Gauge Pointer Clearance

IN CHECKING gauges, it is important to remove the glass cover and examine the clearances behind and in front of the pointer. Usually a mark will be left on the graduated face of the gauge if the hand is rubbing there. However, rubbing on the glass cover is usually not noticeable.

A simple way to check clearance between the pointer and the glass is shown in the illustration. A strip of heavy cardboard, cut as shown, is held under the glass frame, after



Sketch shows simple way of checking gauge pointer clearance with cardboard

which the frame is replaced in its normal position. By rotating the cardboard strip, the clearance can easily be determined. When clearance is insufficient, the pointer should be moved closer to the gauge face if possible.

Put Insulation Inside Duct

BLOCK-TYPE mineral wool is being applied by engineers of Public Service Electric and Gas Co. of New Jersey to the inside of large secondary air ducts at the 300,000-kw Sewaren generating station.

This internal insulation protects itself from expansion cracks which can occur in external insulation in contact with heated sheet metal surfaces. It is also protected against cracks and possible damage from accidental contact by plant personnel and equipment and retains a better appearance over longer periods.

Open rectangular studs were welded to the inside duct surface on 12 in. centers and mineral wool blocks were slid in between the studs and tightly butted together. Long metal pencil rods were inserted in the stud openings over the insula-

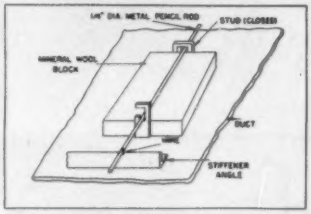


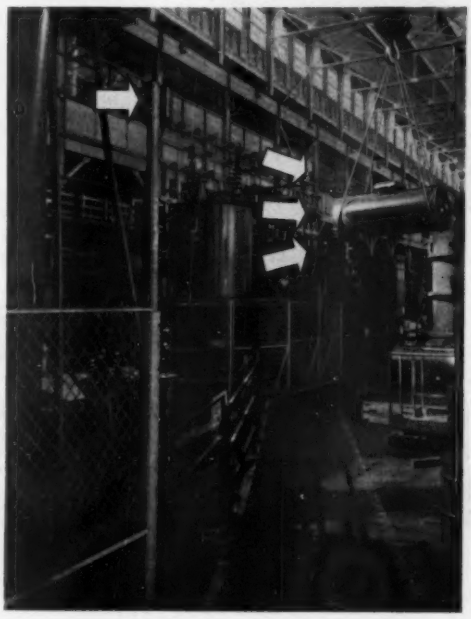
Diagram of technique used to apply insulation to the inside of air duct

tion. The studs were then closed to hold the pencil rods firmly in place.

Stiffener angles on 24 in. centers were welded to the duct surface midway between alternate rows of studs and the pencil rods wired to them. The insulating blocks were then painted with a waterproofing material to prevent moisture absorption from the subsequent cement

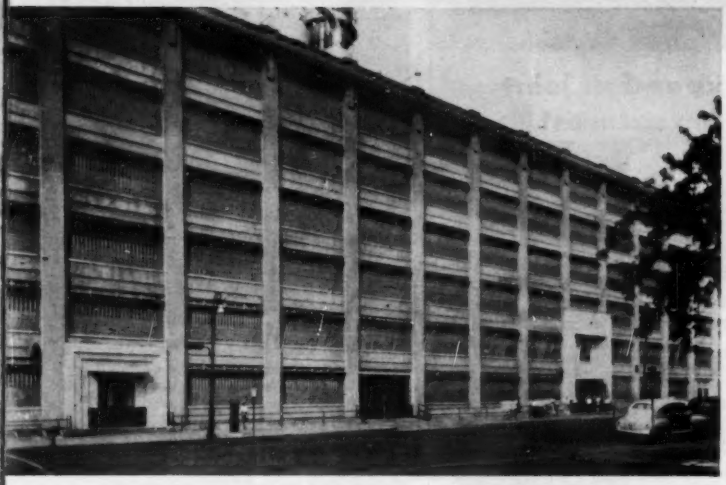
"Wall of Light" Protects Test Area from Heavy Crane Loads

Contributed by Allis-Chalmers Manufacturing Company, Milwaukee, Wis.



Photoelectric cells and intense light beams combine to form a "wall of light" protecting this Allis-Chalmers high voltage test area from encroachment by overhead crane loads. When a load breaks the beam a loud warning horn is set off giving notice to the operator that he is in danger. The horn is shut off from the test office when the load is out of the area. This reduces the possibility of prematurely relaxed vigilance. Three arrows in the background point out the light sources: one of the cells is shown by the arrow in left foreground

BEFORE Daylight Engineering...



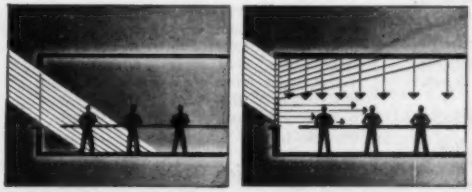
NOW Daylight Engineered

Delco Products Div. of General Motors, Building No. 22, Dayton, Ohio, replaced its windows with Insulux. Architect, Argonaut Realty Company Div. General Motors Corp.

Same plant. Same original basic design and construction. But what a difference outside and in when the Insulux Fenestration System was installed on Daylight Engineering principles.

Now the entire glass area is used for the transmission of light from early morning to late afternoon. For the new Insulux light directing block, No. 363, controls light so efficiently that the building virtually turns with the sun.

Exterior attractiveness is greatly increased. Dust, dirt and prowlers are sealed out. Window pane and sash replacements are ended. Insulux glass blocks are permanent; do not rust or rot. Lighting and heating costs will be cut down. *Objectionable glare is eliminated.*



Direct sun causes uncomfortable brightness near windows, extreme contrast in other parts of room. Insulux Fenestration directs and spreads daylight to ceiling, keeps brightness at comfortable levels.

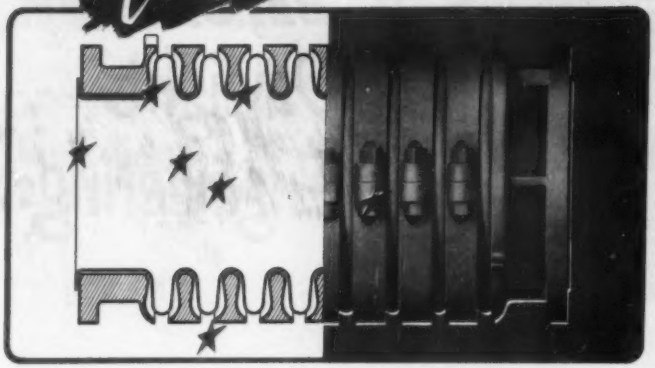
Insulux Glass Blocks are immediately available. Ask for the services of a Daylight Engineer to help you plan an Insulux Fenestration System that exactly fits the requirements of your buildings and manufacturing processes. Call or write: Daylight Engineering Laboratory, Dept. **PE 1,** Box 1035, Toledo 1, Ohio. Insulux Division, American Structural Products Company, subsidiary of Owens-Illinois Glass Company.

INSULUX GLASS BLOCK

INSULUX FENESTRATION SYSTEMS

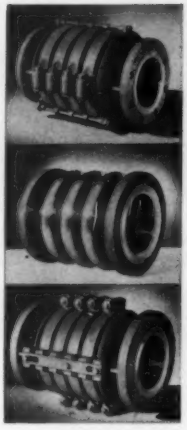
—by the pioneers of Daylight Engineering

ADSCO *Corruflex* is better because...



no other packless expansion joint combines ALL these features!

- **NO MAINTENANCE.** Since the corrugated element, made from a single tube of copper or stainless steel, is a flexing member designed to absorb expansion or contraction, no packing of any kind is necessary.
- **LONG LIFE.** The element is formed hydraulically to ensure uniform wall thickness. Annealing during and after forming relieves all internal strains. Flexing stresses are evenly distributed and are not concentrated at welds or diaphragms.
- **UNIFORM RAISED FACE.** Element is hydraulically lapped over the end flange to form smooth, even face for joining to mating pipe flange.
- **EQUALLY DISTRIBUTED EXPANSION.** Equalizing rings of cast iron or steel control individual corrugation expansion and reinforce element walls.
- **STURDY CONSTRUCTION.** Heavy lugs and rings are cast in a single piece, accurately machined into halves and kept in pairs to ensure a tight joint.
- **COMPLETELY SUPPORTED ELEMENT.** Both end flanges and rings are contour shaped, scientifically designed to support element throughout its entire length. All inner surfaces are carefully hand-finished.
- **COMPACT.** Maximum outside diameter is only slightly larger than that of the flanges. Ideal for installation in cramped quarters.



Corruflex Joints are available in sizes from 3" to 24", single or double units, single or multiple corrugations, with or without self-equalizing rings, and with flanged or welding ends. Supplied in copper, stainless steel or other alloys and with internal sleeves if required.

Corruflex Joints have traverses ranging from fractions of an inch to 15" and operate under pressures from vacuum to 300 psi and temperatures from sub-zero to 1600F.

ADSCO offers the most complete line of expansion joints—both packed and packless—available from any manufacturer. For an impartial recommendation, consult the company that makes all types.

Send for New 16-page Bulletin No. T-35-51

Explains design and construction and completely describes the line . . . sizes, temperature and pressure ratings, dimensions and weights. Simplified selection charts make it easy to determine proper joint for most applications. Recommended installation practice is summarized.

Expansion Joints
Steam Traps · Meters
Anchors · Guides

ADSCO Since 1877

Heat Exchangers
Strainers · Separators
Casing · Supports

AMERICAN DISTRICT STEAM COMPANY, INC. • North Tonawanda, N.Y.

coat. To complete the installation, expanded metal lath was wired to the pencil rods as a key for a 1-in. thickness of refractory cement.

Special Paint Doubles Finish Life of Transformers

Contributed by Westinghouse Electric Corp.

THE LIFE OF the finish on pole-type distribution transformers has been more than doubled by a three-coat, mica-base paint system that has been given the name, "Coastal Finish." Each coat functions cooperatively with the others to withstand the oxygen, acids, salts and alkalis found in seacoast and industrial atmospheres.

Each coat of the new finish has a special function. The first coat is applied after the metal has been cleaned and treated with phosphate solutions to form an ideal surface. Zinc chromate combined with iron oxides in a suitable vehicle provide a coat with desired flexibility for thermal expansion and contraction and for chemical resistance to salts, acids and alkalis.

These transformer tanks were subjected to 1,000 hour salt spray test. Tank at left has Coastal Finish; the tank at right has a standard finish

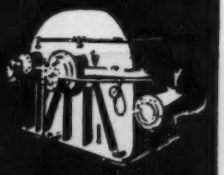
The second coat, consisting of mica flakes, gives a "shingled roof" effect to ward off moisture and oxygen. The mica enhances heat stability of the paint as much as ten times at the elevated temperatures at which distribution transformers operate.

The third coat screens out ultraviolet light from the sun, enhances resistance of the other two coats to corrosive elements, and adds to appearance.

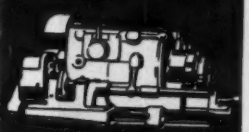
People Handling Perfected At Pontiac Plant

A NEW PONTIAC "Chieftain" is now taking visitors to the Pontiac Motor Division of General Motors on a two-and-a-half mile trip through the plants in solid comfort.

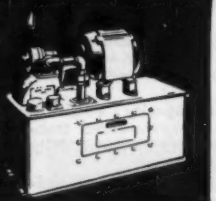
The Chieftain is a three-coach,



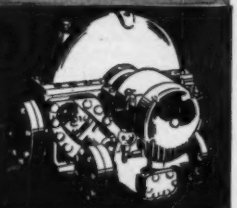
SPEED REDUCER



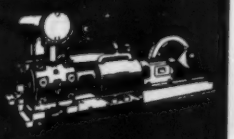
HEAD STOCK GEARS



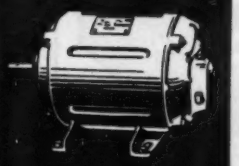
HYDRAULIC SYSTEM



AUXILIARY TURBINE



COMPRESSOR



MOTORS

Now better than ever

NEW

STANOIL
TRADE MARK
Industrial Oil

Brings two new benefits to wide range of jobs

For 14 years, STANOIL Industrial Oils have proved their ability to handle a wide variety of jobs in midwest plants. Now, these established products have been made better than ever! They offer these new and important savings in an even wider variety of industrial equipment.

1 LONGER OIL LIFE

Because they have greater oxidation stability, the new STANOILS stand up under high temperatures of operation, maintain low acidity for longer periods of service which helps keep oil systems free from deposits caused by oil oxidation.

2 GREATER PROTECTION against RUST

A corrosion inhibitor of the most advanced type has been added to all grades of the new STANOILS that benefit by such an additive. This inhibitor prevents corrosion trouble by "plating out" on surfaces that tend to rust. In such severe service as paper-machine and steam-turbine lubrication, new STANOILS have put an end to rust and corrosion troubles.

At the left are shown several types of equipment in which the new STANOILS can save you money and maintenance time. A Standard Oil lubrication specialist will help you find still other applications where versatile STANOILS can replace many special-purpose oils. You can reach this man quickly and easily through your local Standard Oil Company (Indiana) office. Contact him today. Or, if you wish, write: Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL COMPANY (INDIANA)

STANDARD

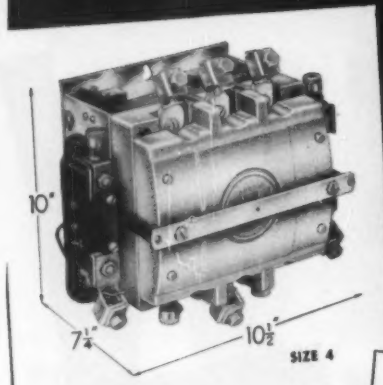
CHANGE FOR THE BETTER!

WITH THE

New

ARROW AH HART

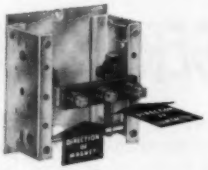
TYPE "RA" MAGNETIC STARTERS



JUST ½ THE SPACE

Motor requirements change. Often the horsepower of operating units must be increased where space is at a minimum. This calls for Arrow-Hart "RA" Magnetic Starters, which occupy *just* ½ *the space* of conventional starters. Besides their revolutionary small size, A-H starters give you *straight-thru front wiring* for fast and easy servicing, and many other performance extras.

NEW "RA" MECHANISM



Best reason for replacing with Arrow-Hart! This exclusive right angle balanced mechanism does the work of a unit twice its size — and does it more dependably, for years longer! Note that magnet action is vertical, contacts meet horizontally . . . that means finer balance, with positive action, in a smaller package. Add easy installation, more working room in the box, and easy-to-reach terminals and contacts, and you have some of the many reasons why nationally recognized manufacturers are replacing with Arrow-Hart. Here's how you can get *all* the details:

WRITE FOR LITERATURE

Write for the "RA" folder, which features complete information on the Arrow-Hart line of magnetic starters — available in local and remote control or selector switch types in all sizes. Send for this free booklet today.

ARROW AH HART

THE ARROW-HART & HEGEMAN ELECTRIC CO.

ARROW·HART

1101 HAWTHORN ST., HARTFORD 6, CONN.

Visitors tour the plants of Pontiac Motor Division of the new "Chieftain" covering the foundry, motor, axle, sheet metal plants final assembly line

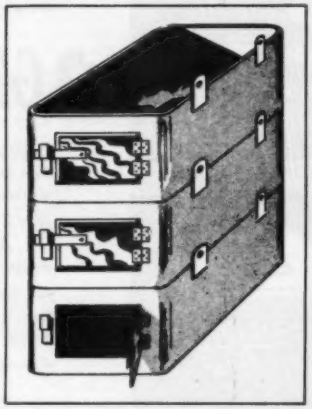
27-passenger-capacity vehicle, pulled by a battery-powered tractor, which is making four trips daily to accommodate visitors.

For more than an hour the Chieftain rolls up and down the aisles of the huge Pontiac plant, the passengers sitting back comfortably on soft leather seats. Their guides describes the manufacturing operations over a built-in public address system, his voice coming through loud speakers located under each seat.

Take Your Pick

Contributed by J. Schnellbacher, Allis-Chalmers Mfg. Co.

CORRUGATED STEEL hoppers stacked four high are used for the storage of 13 different sizes of transformer covers and eight different sizes of tank bottoms and heads.



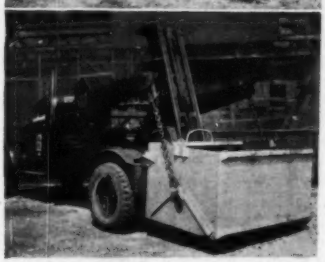
Hinged doors permit men to secure various sized covers without the need of unpiling hoppers to reach lower bins

★

DEMPSTER DUMPSTER SYSTEM

SERVING COST-MINDED MANAGEMENT FROM COAST TO COAST

. . . handling bulk materials of every description at phenomenal savings



Photos show the three simple stages of servicing a container. The Dempster-Dumpster, operated from hydraulic controls by driver in the cab, picks up each container and hauls it to point of disposition where it may be dumped or set down intact.

★

J&L STEEL — *recognized across the nation*

. . . Jones & Laughlin Steel Corp., well known for sound management, uses the Dempster-Dumpster System

J & L Steel is among the hundreds of well managed manufacturers, both large and small, who use the Dempster-Dumpster System of bulk materials handling . . . the system recognized across the nation for its efficiency and ability to reduce costs.

There is never an idle moment for a truck mounted Dempster-Dumpster around a manufacturing plant. With a variety of Dempster-Dumpster containers spotted inside and outside your plant, one truck mounted Dempster-Dumpster, with only one man, the driver is kept busy servicing one pre-loaded container after another. These detachable containers, ranging in size up to 12 cu. yds., carry pay-loads equal to conventional truck bodies. They are built in a wide variety of designs best suited to the type of materials handled—be they bulky, light or heavy . . . solids or liquids . . . trash or rubbish.

In addition to cutting man-hours and reducing truck investment, gas, oil, maintenance costs, the Dempster-Dumpster System improves "housekeeping" methods . . . reduces fire hazards . . . provides an easier, quicker, safer and more efficient manner of handling materials. It will pay you to investigate the Dempster-Dumpster System now! A product of Dempster Brothers, Inc.

One Dempster-Dumpster Services All Containers. . . All Designs. . . All Sizes

DEMPSTER BROTHERS • 111 Shea Building • Knoxville 17, Tennessee

3 men
+ 3 "j" hoists

multiply production many times

Here's proof that small companies as well as large can increase productivity per man with R & M hoists. Finger Lakes Chemical Co., Inc., Etna, N. Y. has repeat-ordered R & M "J" hoists again and again to permit vertical as well as lateral materials handling in the progressive expansion of plant operations to the upper floors and to the basement of their building. "Each time a hoist was installed," writes Mr. C. S. Benjamin, vice president, "we acquired a substantial increase in productive capacity *without increased labor*. In fact, the work became easier for the men. Today, as manufacturers of detergents . . . we receive and ship in carload and truckload quantities, with the entire operation being accomplished by a force of three men and one foreman."

With an R & M crane or hoist installation engineered to your job—more production per man or per foot of floor space may be easier to obtain than you think. Your nearest R & M field engineer will be glad to study your requirements without obligation. Write for Bulletin No. P11E.

TAKE IT UP WITH

ROBBINS & MYERS INC

MOTORS HOISTS CRANES FANS MOYNO PUMPS

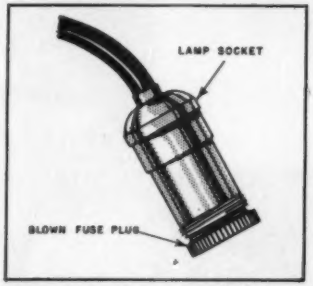
HOIST AND CRANE DIVISION, SPRINGFIELD 99, OHIO

In the past, because it has been necessary to remove and replace two or more hoppers, it has taken a man about a half-hour to obtain certain sized covers, bottoms or heads from the bottom hoppers.

Now, openings are being cut into one end of the hoppers and a hinged door with lever installed. This permits removal of the covers and bottoms without unpiling or removing the hoppers at a saving of many man hours daily.

Lamp Receptacle Protector

AN ORDINARY blown plug fuse can be employed to close open lamp sockets and receptacles, as well as old-style screw thread convenience receptacles in the wall or baseboard,

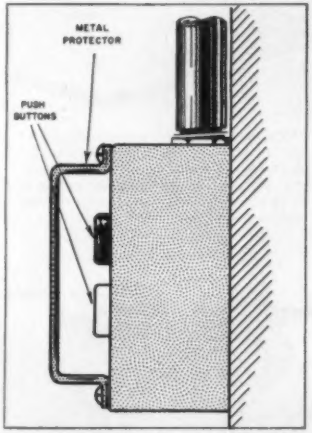


Safety feature to keep sockets closed

and thus provide protection against accidental contact with such open electrical connections. The fuse should be screwed tight to help prevent its loosening.

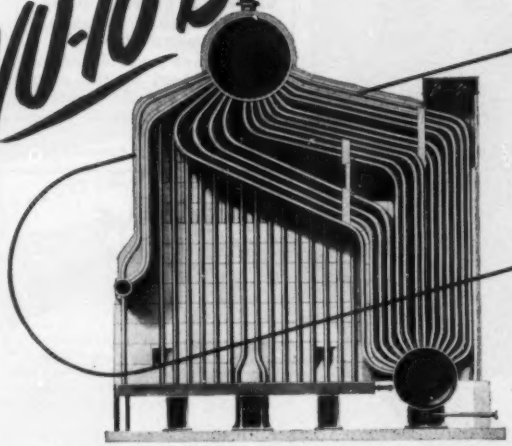
Push Button Protection Against Accidental Switching

PUSH BUTTONS and overload reset buttons on motor controller circuits are at times so placed that they can be ac-



A metal strip placed over push buttons is safeguard from accidental switching

Who Buys VU-10 Boilers?



Representative large companies that have purchased VU-10 BOILERS

Air Reduction Company
American Locomotive Co.
Armour & Company
Borg Warner Corporation
Thomas A. Edison, Inc.
Ford Motor Company
Robert Gair Company
General Foods Corporation
B. F. Goodrich Chemical Co.
Illinois Packing Company
Johns-Manville Products Corp.
Jones & Laughlin Steel Co.
Liebmann Breweries, Inc.
Liquid Carbonic Company
National Distillers Chem. Co.
New York Central R.R.
Owens-Illinois Glass Co.
The Pennsylvania Railroad
Remington Arms Company
Revere Copper & Brass Co.
R. J. Reynolds Tobacco Co.
Joseph Schlitz Brewing Co.
Sharpe & Dohme, Inc.
Sunshine Biscuits, Inc.

C-E Vertical-Unit Boiler Type VU-10

The VU-10 Boiler is designed for industrial load conditions and particularly for plants having small operating and maintenance forces. Capacities range from about 10,000 to 60,000 lb per hr. Firing may be by spreader, underfeed or chain grate stokers or by oil or gas burners. Superheater, economizer or air heater surface may be added if desired.

A quick answer is that VU-10 purchasers include industrials ranging from very small to the largest, as well as schools, hospitals, institutions, and, in fact, every type of establishment that requires boilers in the VU-10 capacity range. Why, then, limit the list of representative users shown above to names known to everyone as among the biggest industrial enterprises in the country? Because such names form a significant guide for a prospective boiler buyer, in the same sense that the buying decisions made by operators of large truck fleets can be a reliable guide for the man who wants to buy a single truck.

This reasoning applies *especially* to the purchase of a boiler. Big companies buy boilers frequently . . . therefore their experience is always up to date. They buy them for plants in many locations, using many different fuels. They buy them in capacities from very small to very large. Their requirements justify the employment of highly qualified engineering specialists — both staff men and outside consultants. Thus they have the breadth of experience and the expert guidance requisite to making the soundest equipment selections.

And perhaps equally important, big companies tend to place more emphasis on long-term operating and economic results. They know from their own experience that daily operating economies accruing through the years from better design and construction features will quickly offset the difference in first cost between the cheapest boiler they can buy and the best the market affords.

So if your steam requirements call for boilers in the capacity range from 10,000 to 60,000 lb of steam per hr, we submit the accompanying representative list of large companies that have purchased VU-10 Boilers as a sound reason for confidence that your decision to buy a VU-10 will prove to be a highly profitable one—not only for the first few years of service but throughout the lifetime of the installation.

B-423A

COMBUSTION ENGINEERING—SUPERHEATER, INC.

200 Madison Avenue • New York 16, N. Y.

ALL TYPES OF BOILERS, FURNACES, PULVERIZED FUEL SYSTEMS AND STOKERS; ALSO SUPERHEATERS, ECONOMIZERS AND AIR HEATERS

FABREEKA

CONVEYOR *and* TRANSMISSION *Belting*

Proven superior to all other types in these manufacturing or processing industries—

Abrasives · Chemicals · Confectionery · Conveyors · Dairy Products · Electrical Equipt. Fish · Food · Glass Containers Hats · Metals · Optical Mfg. Packaging Equipt. · Paper. Pharmaceuticals · Plastics Printing · Roofing · Soap · Textiles · Tobacco · Watches and Clocks · Wood Products.

Since 1918 The Standard of THIN PLY BELTING

GET THIS NEW CATALOG

Made by the PIONEERS IN THIN PLY *Construction*

FABREEKA consists of multiple plies of a special light weight, closely woven duck impregnated with special rubber compounds and is made in a wide variety of thicknesses and widths to suit the most exacting requirements. Fabreeka Belting is characterized by its Strength — Flexibility — Minimum Stretch — Minimum Shrinkage — Lack of Seams or Joints — Resistance to Moisture, Steam and Chemical Vapors — Cleanliness — Even Trackage — Positive Traction on Pulleys — No Fraying or Ravelling of Edges.

SEE FABREEKA *Before You Buy Again*

***Next Time You Buy* SPECIFY FABREEKA**

Write for the New Fabreeka Belting Catalog

FABREEKA PRODUCTS COMPANY, INC.

222-E SUMMER STREET, BOSTON 10, MASSACHUSETTS

NEW YORK · CHICAGO · DETROIT · SPARTANBURG, S. C.
PHILADELPHIA · PITTSBURGH · OAKLAND, CAL.

cidentally operated by being struck, thus switching on or off motor-driven equipment.

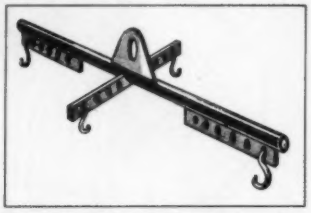
A simple way to prevent this is to attach a strip of substantial metal, suitably bent as shown, to the enclosing case. This permits the button to be depressed when desired but not accidentally.

Lifting Rig Handles Objects of Different Sizes

Contributed by W. J. Jansen, Allis-Chalmers Mfg. Co.

ROPES AND HARD roll copper springs formerly used by the company to take turbo coils off winding machines have been supplanted by a lifting rig.

This lifting rig, constructed of pipe

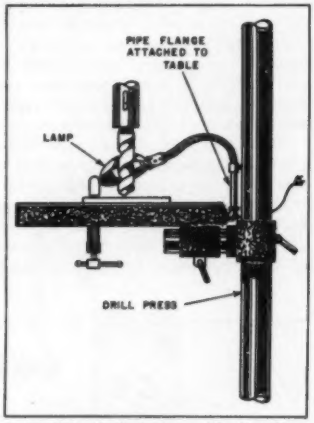


This lifting rig comes in handy when moving objects of different sizes

with three cross bars and crane eye hook, plus the use of 4 S hooks and rope slings, is very helpful in moving various sized objects from place to place. The holes in the cross bars permit easy adjustment of S hooks to suit particular width and length of object to be carried.

The new rig has proven to be a great time saver and is much safer over the old method used.

Light Very Helpful For Close Drill Work



A flexible desk lamp—with the base removed—attached to a pipe support by welding or clamp, will provide an ideal light for illuminating work area

Dust Control System on Rotary Breaker Screen and sand handling system in a casting plant of one of the nation's largest steel companies.

The large volumes of dust produced in the sand handling operations of this plant are not a problem. As soon as dust is formed, it is removed by the KIRK & BLUM Dust Control System.

One of the many KIRK & BLUM foundry installations, this Dust Control System meets every requirement of the American Foundrymen's Association code; heavy gauge piping has flanged joints and convenient clean-out doors.

Hundreds of plants, large and small, have found it pays in *greater operating efficiency* to have a dust or fume control system designed and installed by experts. For all three—design, fabrication and installation—call on KIRK & BLUM.

If you need a new dust control system . . . or more capacity in an existing one, contact KIRK & BLUM. They'll gladly prove the money-saving efficiency of systems by KIRK & BLUM, specialists in dust and fume control for more than 43 years. For Booklet, write The Kirk & Blum Mfg. Co., 2889 Spring Grove Ave., Cincinnati 25, Ohio.

FOR CLEAN AIR... THE INVISIBLE TOOL

One Undivided Responsibility
DESIGN...FABRICATION...INSTALLATION
For all three—call on K&B

KIRK AND BLUM

DUST CONTROL SYSTEMS

400° F.

350° F.

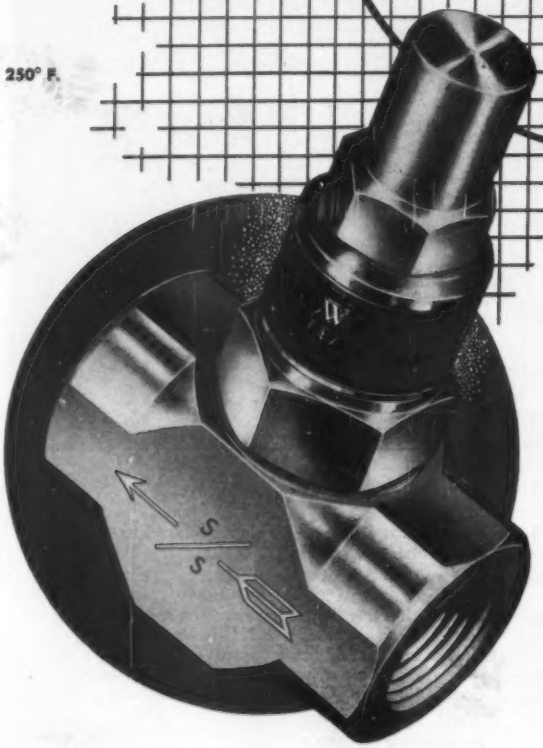
300° F.

250° F.

FOR EVEN TEMPERATURES

YARWAY

STEAM TRAPS



● Processes requiring careful temperature control call for Yarway Impulse Steam Traps on steam equipment.

The reason! . . . Yarway traps maintain even temperatures because they *continually* sample and respond to a trickle of the condensate. There is no arrest in flow, no waiting for large quantities of condensate to accumulate, or trapped steam pockets to condense.

Other reasons why Yarway Impulse Traps have become first choice in many thousands of plants:

- They get equipment hotter, sooner
- Small size, light weight
- Easy to install, easy to maintain
- Only one moving part
- Good for all pressures
- Stainless steel construction
- Low cost

If you are not already familiar with these and other advantages of the Yarway Impulse Steam Trap, try one *for free* and find out for yourself. Call your nearby Yarway distributor, or write to:

YARNALL-WARING COMPANY

145 Mermaid Avenue • Philadelphia 18, Pa.

BRANCH OFFICES IN PRINCIPAL CITIES

Stainless Steel Body

YARWAY IMPULSE STEAM TRAP

What's Ahead on War Time Controls

Priority DO's, their use, application and limitations . . . Distinction between "After Korea" and "After China" periods . . . Complications as defense demands mount . . . Current materials difficulties . . . Organization of control agencies and development . . . The new ODM . . . Wage, price and materials controls complete before July

CREATION OF THE NEW Office of Defense Mobilization brings about a complete realignment of emergency war agencies set up in September to meet the limited mobilization objectives of the post Korean period. This new super agency will combine the power and authority of the old WPB and OWM with a new touch, direct responsibility only to the President.

To meet the greater needs of the post China period, many of the emergency powers delegated to old line agencies in September, as shown in Table I, will be concentrated in the new agency. This transfer will take time. Declaration of a state of National Emergency requires the formulation of new policies. The implimentation of these policies, particularly in regard to controls, will also take time.

For the immediate future, therefore, industry must live with the present priority system. In the brief period "After Korea" and "Before China" the objective was a few guns and nearly the normal supply of butter. Since the intervention of China, it has been apparent that this program is no longer adequate. The extent of the revision, however, is still indeterminate. Nevertheless certain trends are noticeable.

The pattern of either a wartime or semi-wartime economy control system is reasonably well set and it has been demonstrated that: Our material, plant and manpower resources will not support both: business at its present level; and, a sizable defense program.

Because of control over materials, NPA (National Production Authority, at present a unit of the Commerce Dept.) activities are of prime interest to the manufacturing industries. The NPA is, however, but a small part of the defense setup. The National Defense Act of 1947, (the Unification Bill) was written to take advantage of the lessons learned in two World Wars and strengthen national security.

This law provides, among other things, for three key agencies shown shaded in the organization chart, Fig. 1. The NSC coordinates military and foreign policy. The NSRB is normally a small organization, utilizing regular government agencies as fact finding sources. They prepare and study much of the legislation proposed to meet wartime conditions.

Following the Korean trouble, Congress passed the Defense Production Act of 1950. In an Executive Order dated September 9, duties, responsibilities and authorities were delegated as shown by Table II.

Following this, the new NPA set up within the Department of Commerce was in action quickly and issued the first inventory control regulation the latter part of September. The purpose of NPA Reg. 1 was to prohibit accumulation of excessive inventories of short supply items. It states simply that the ratio of inventory to scheduled operation must not exceed that set by practice in the recent past.

Subsequent activities of the NPA are listed in Tables II and III. These are in three series. Regulations and M orders are important to industry while delegations of authority are of interest only to the military departments involved.

The Defense Production Act provides penalties of $10,000 or imprisonment for one year, or both for failure to comply with any NPA order or regulation. Copies of these rulings should be available for study in every company office.* Delegations of authority to issue DO's have been made to the Sec. of Defense, A.E.C., N.A.C.A. and U. S. Coast Guard. Within these departments the authority can be redelegated downward.

Regulation 2 established the priority or so-called Defense Order (DO) system. This system is simple and planned to meet the objectives of a limited defense program. Briefly the purpose was to: divert roughly 15 per cent of basic raw materials to defense purposes, cut civilian use by an equivalent amount, and, thus maintain over-all production at the January-June 1950 level.

The DO order applies only to defense contracts and its use must be authorized by the procurement agency involved. It is prefixed by two numerals indicating the program, i.e. DO 22 is construction. The contractor may extend this DO rating when ordering material for the contract by noting the DO rating on the purchase order and adding "Certified Under NPA Regulation 2."

Two points are of special interest. The regulation states "All DO rated orders shall have equal preferential status." Defense Departments complain because there is no selective priority

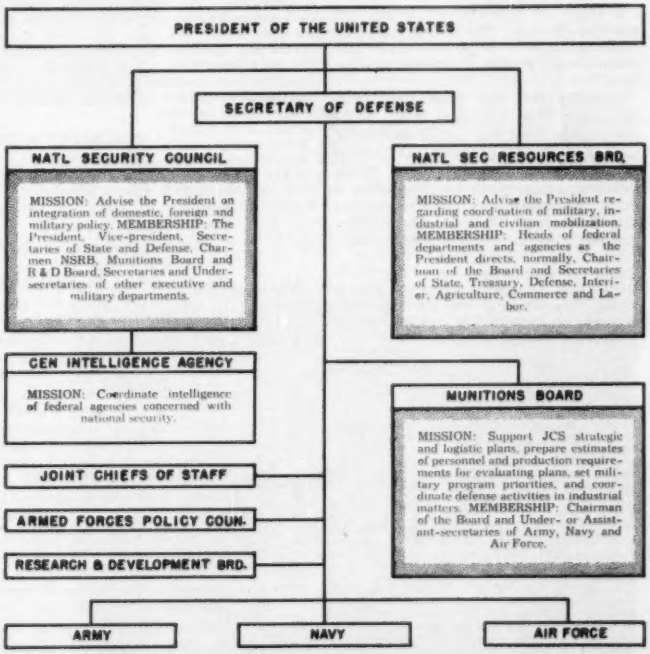

PRESIDENT OF THE UNITED STATES
SECRETARY OF DEFENSE
NATL SECURITY COUNCIL
MISSION: Advise the President on integration of domestic, foreign and military policy. MEMBERSHIP: The President, Vice-president, Secretaries of State and Defense, Chairmen NSRB, Munitions Board and R & D Board, Secretaries and Undersecretaries of other executive and military departments.
NATL SEC RESOURCES BRD.
MISSION: Advise the President regarding coordination of military, industrial and civilian mobilization. MEMBERSHIP: Heads of federal departments and agencies as the President directs, normally, Chairman of the Board and Secretaries of State, Treasury, Defense, Interior, Agriculture, Commerce and Labor.
GEN INTELLIGENCE AGENCY
MISSION: Coordinate intelligence of federal agencies concerned with national security.
MUNITIONS BOARD
MISSION: Support JCS strategic and logistic plans, prepare estimates of personnel and production requirements for evaluating plans, set military program priorities, and coordinate defense activities in industrial matters. MEMBERSHIP: Chairman of the Board and Under- or Assistant-secretaries of Army, Navy and Air Force.
JOINT CHIEFS OF STAFF
ARMED FORCES POLICY COUN.
RESEARCH & DEVELOPMENT BRD.
ARMY
NAVY
AIR FORCE

Fig. 1. Three key defense agencies set up by the National Security Act of 1947 are shown shaded. The NSB is a fact finding and policy agency; the MB a military agency; The NSRB is an over-all policy agency to correlate military and civilian requirements with productive capacity. Note the cross-membership for liaison purposes. Status of the NSRB on a wartime basis is still indefinite

Table I. Other agencies brought directly into the defense picture since Korea with authority as delegated by Executive Order implementing the Defense Production Act of 1950. Responsibilities indicated by * will be taken over by ODM

1. Secretary of Interior — petroleum*, gas*, solid fuels* and electric power*.
2. Secretary of Agriculture — food*, domestic distribution of farm equipment* and commercial fertilizer.
3. Commissioner, Interstate Commerce Commission — domestic transportation*, storage and port facilities (excl. air transport, marine shipping).
4. Secretary of Commerce — all materials* and facilities* except 1, 2 and 3 above. The National Production Authority* was set up for this purpose.
5. Administrator of General Services — stockpiling, government plant and equipment purchases, requisition powers, government equipment for private plants.
6. Reconstruction Finance Corp. — loans for defense production and development.
7. Board of Governors, Federal Reserve Board — consumer and real estate credits.
8. Housing & Home Finance — real estate loans for residential property.
9. Secretary of Labor — manpower for defense and civilian demands.
10. Attorney General and Chairman, Federal Trade Commission — clearance against anti-trust suits for industry conferences and voluntary trade agreements.
11. Economic Stabilization Board — wage and price controls, economy stabilization.
12. Chairman, National Security Resources Board — policy, coordination* and monitoring* defense program and Certificates of Necessity*.
13. Federal Civil Defense Administration — civil defense.

"to get first things done first," to correct faulty scheduling or meet the changing needs of combat forces. Contractors complain for the same reason. Civilian manufacturers complain of unfair distribution of material.

The second point which should be noted is: DO's cannot be extended to get material "for plant improvements, expansion, or construction, or to get machine tools or other items . . . carried as capital equipment or to get maintenance, repair or operating supplies."

Recently this has been liberalized somewhat. The extension must, however, come from the prime contractor and the local procurement offices should be consulted for advice. While this restriction seems unreasonable, it must be remembered that the regulation was written for a limited military program. The intention was that wherever possible defense contracts should go to contractors who were equipped to handle the work with available facilities.

NPA series of M orders involve allocations, limitations and conservation of basic raw materials. They are clearly written and follow a set pattern.

Provision for industry conferences and voluntary agreements are written into the Defense Production Act. Protection against anti-trust suits is guaranteed. To comply with this two requirements must be met: the meeting must be called by and presided over by a government representative; and minutes of the meeting must be kept. Necessary provisions are being adhered to and the hesitancy of some companies to participate is not well founded.

M orders are listed in Table III. In general, producers are obligated to accept DO orders up to a specified percentage of their capacity. No maximum is set. Users are limited to about 100 per cent of regular consumption including of regular consumption over and above DO requirements. Regular consumption is defined as the average monthly use over the base period, Jan.-June 1950.

Inasmuch as business activity in the latter part of the year was materially higher than in the first half, cutbacks in many cases are heavier than indicated by the limitation figures. While the average DO figure is about 15 per cent, actual figures for different materials and for different products range from 5 up to 40 per cent.

From the standpoint of plant engineers only a few of the M orders are of specific interest. These are indicated in Table III by an asterisk. Plant engineering, including maintenance and repair, use limitations are placed at 100 per cent of the average monthly usage for the same purpose during the base period. Details of each order concerning these should be studied carefully.

Table II. Regulations issued by NPA. Regulation 1 covers inventory limitations; Regulation 2 sets up the basic priority or present DO control system

REG. NO.	SUBJECT	DATE LAST AMEND.
1	Inventory control and Int. No. 1, 2 and 3	10 Nov.
2	Basic rules of the Priority System or DO orders	16 Nov.
3	Priorities operation between Canada-U. S.	8 Nov.

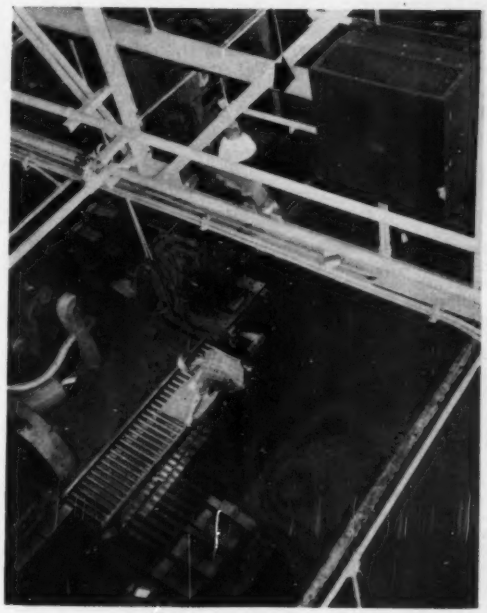
* Up to 5 copies of specific NPA regulatory material may be obtained by manufacturers free upon request to U. S. Department of Commerce, Div. of Printing Service, Attn. E. E. Vivian, Rm. 6225, Washington 25, D. C. Larger quantities must be purchased. A request for a specific Reg. or M-order will automatically bring the latest amendment so the date should not be specified except for purposes of bringing a file of changes up to date.

These and other official government regulations are published by the Federal Register, an official government publication issued daily. The subscription price is $15 a year or $3.00 a month, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Table III. Limitation conservation and allocation of specific materials is covered by NPA M-orders. Those marked * have specific reference to capital equipment, construction, maintenance, repair and/or operating supplies. The priority setup, intended to handle a limited defense program, will probably be modified soon

M— No.	SUBJECT AND PURPOSE	DATE LAST AMEND.
1	Steel — Producers rules for accepting DO orders (Sup. 1, 26 Oct. covers directives, freight car program).	1 Dec.
2	Rubber — Limits use of natural and synthetics by rubber manufacturers and users.	11 Dec.
3	Columbium Bearing Steel-Limits production, sale and purchase to DO orders.	19 Oct.
4*	Construction — Prohibits non-essential construction.	15 Nov.
5	Aluminum — Rules for accepting DO orders by producers, fabricators, distributors and jobbers.	27 Oct.
6	Steel Distributors — Equitable distribution of steel (beyond DO requirements) from producers to distributors for normal trade channels.	15 Dec.
7*	Aluminum — Limits use of aluminum available for civilian use (beyond DO requirements).	1 Dec.
8	Tin — Special inventory and report requirements for tin, tin alloys and tin products in connection with production, distribution, importation and use (beyond requirements of NPA Reg. 1).	13 Nov.
9	Zinc — Rules for accepting DO orders for zinc products.	16 Nov.
10	Cobalt — Limits cobalt inventories to 20 da requirements.	30 Nov.
11	Copper — Rules for accepting DO orders by producers and distributors of copper base alloy products—including wire and cable.	29 Nov.
12	Copper — Limit use of copper and copper base alloys available for civilian use (over DO requirements).	29 Nov.
13	Rayon — Rules for accepting DO orders by producers.	1 Dec.
14*	Nickel — Limits use of primary nickel for civilian use (above DO requirements).	1 Dec.
15*	Zinc — Limits use of zinc metal products for civilian use (above DO requirements).	11 Dec.
16	Copper—Scrap acceptance and delivery.	11 Dec.

FIT DETAILS TO THE SPACE AND TO THE JOB

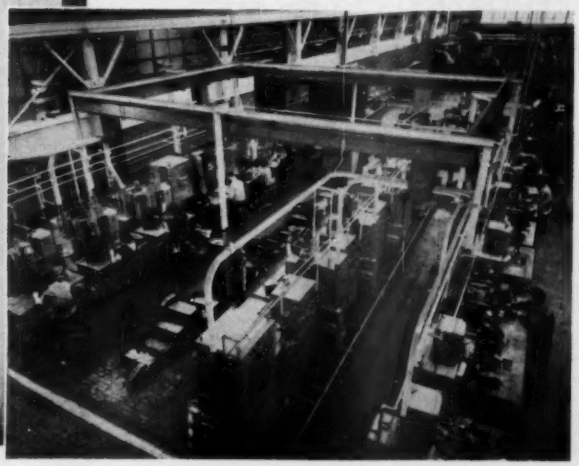


By L. G. ATKINSON, Works Engineer
Beaver Plant, Westinghouse Electric Corp.

● **FOR SMALL AMOUNT OF D-C**—The d-c supply at the Beaver plant of Westinghouse Electric Corp. is obtained primarily from selenium rectox rectifier units such as the one shown here. This particular unit is a truss-mounted, 3 hp power pack used to supply d-c to a motor on a punch press. The total load in this plant was not sufficient to warrant installation of d-c motor generator sets and d-c distribution feeders. This installation gives the plant a quick, economical installation when d-c is required. The a-c is plugged into bus duct and d-c feeds direct to the motor

● **FOR CONCENTRATED HEAVY LOAD**—Below, Right: Eighteen welders from 10 to 75 kva capacities are fed by the 1500 amp bus ring. The bus ring reduces the voltage drop to the various welders and, in addition, greatly simplified our installation wiring. Note that there are four cable tap boxes, one near each corner of the ring. The actual welder supply cable runs from the nearest cable tap box to the welder, thus making a short, simplified run. The use of a complete ring permits minimum voltage drop to any welder. Welders are supplied by a 428 kva, 2300/230 v transformer

● **MOVABLE PARTITIONS ISOLATE TEST AREA**—Below, Left: Assembly and final test of our entire line of AB breakers requires a clean room with a constant temperature of 76 F at all times. When the plant was purchased, considerable prefrabricated shop office partitions were found installed. These partitions, of the movable type, were removed and re-installed to form a double partition. This double wall provides air space insulation around the "constant temperature room." The temperature in the room is maintained at 76 F plus or minus 1 deg throughout the year. With the partitions, and a false ceiling 12 ft high that contains 4-in. of asbestos insulation, we are able to maintain the temperature with two 100-ton compressor units. The work load consists of surface losses, fresh air, machines, lights, and body heat gain from 250 people. The room has a floor space of 32,925 sq ft, or slightly more than ¾ acre



VERTICAL TRANSPORTATION

Freight and passenger elevators, necessity for study of location, types, controls, doors, speed . . . Escalators and their place in the industrial plant . . . Conditions governing their choice . . . Pallet elevators, their advantages and when to use . . . Spiral conveyors and dumb waiters . . . Advantages and disadvantages of between-floor ramps . . . Ferris wheel and special type elevators may be employed for special jobs

By R. M. FRANCIS, Plant Engineer

ALL EQUIPMENT, methods, and procedures employed in moving materials, machines or personnel up or down in a plant, come under the category of "vertical transportation." Years ago, passenger and freight elevators served the field quite adequately, with an occasional conveyor thrown in for special applications. Today, however, the materials-handling field requires a number of devices to furnish complete and efficient coverage.

Freight Elevators

Freight elevators play such an important part in any multi-story plant operation that considerable study and care must go into their selection and location. The elevator manufacturers will gladly engineer any proposed installations, but certain basic details must be pre-determined by the owner, or plant engineer. Location is generally prescribed by other building details, such as loading docks, floor layouts, etc. When once established, it is one facility that must be lived with—good or bad.

If an elevator is to be installed in an existing building, it would be well to consider the construction of an outside hatch, if floor space is not readily available, or if the inside location will require extensive relocation of machinery or facilities. Also, the construction work inside a building causes a certain disruption to normal production functions. As elevator hatches, or shafts, must be fire-proof and completely isolated from the rest of the building, the cost is practically the same—whether inside or outside the building.

To operate freight elevators most efficiently, it is imperative that loading areas be provided adjacent to each floor opening. This fact plays an important role in the determination of location, as such loading areas are not readily available in all parts of the plant. Permanent traffic aisles offer another factor in this regard; some aisles come into existence as afterthoughts and can (and probably should) be relocated to fit in with the new elevator location. Regardless, a study of each floor is necessary to properly spot the new elevator.

A composite study, then, is to include the following considerations: 1. Shipping and receiving dock locations; 2. Permanent aisle layouts; 3. Warehouse locations; 4. Availability of loading areas; 5. Real estate conflicts; 6. Total construction costs; 7. Flexibility in future arrangements.

Next, in order of importance, is the business of "sizing" a freight elevator. Much has been done in recent years by materials-handling engineers to sell industry on the need for elevators which will adequately handle fork trucks and unit-loads. While it is not generally considered good practice to tie up the running-time of a fork truck by hauling it along with its load, in a freight elevator, it is necessary for it to operate into the elevator for loading.

This presents problems of accurate leveling, impact loading, car balancing, door heights. These design features have been worked out by the major elevator manufacturers, and are now a matter of routine. The specifications should, however, be written around these basic points. The additional cost of providing the extra car size—or capacity—will be substantiated by the extra pay-load that can be handled.

All properly constructed freight elevators should incorporate certain features which will improve their operation. A car telephone, for instance, will facilitate scheduling of loads, and will bring first aid in cases of emergency. Bi-parting doors, mechanically operated, will speed up operations greatly. Good car lighting is a must; maintenance-free floors save operational down-time; a folding seat for the operator is a most welcome accessory; car-position indicators on each floor will facilitate the movement of freight and truck alike.

These are extra features that go into the make-up of a completely modern freight elevator. Of course, the basic features of car, hoist, and control design must be investigated. Elevator maintenance can be very expensive unless care is taken in the selection of such things as controls and lubrication accessories. Accessibility of working parts is essential to low maintenance, also. These points can be determined only by inspection of jobs installed and working. Look at recent installations, talk to the elevator maintenance mechanics and operators.

Automatic leveling is not only desirable, it is a must. Lost time in elevator movement comes from leveling and door operation, not in travel time. Then, too, safety of truck handling hinges upon the car platform being level with the building floor, to avoid unnecessary impact loads. The cost of this feature is not prohibitive, and will be quickly offset by the speed-up of loading and unloading.

Some consideration must be given to the possible use of freight elevators for passenger service. Although discouraged by state labor regulatory boards, most states have provisions for combination freight and passenger service by the application of added safety devices. One is extra

car gates which prevent persons from becoming injured by coming in contact with the walls of the shaft while car is in transit. If combination service is desired, be sure to check the state safety code and city code before proceeding with selection of equipment.

Freight elevator controls can be manually-operated, or automatic. In either case, as mentioned above, the car should have automatic leveling to be most efficient. An operator on each car will contribute greatly to the over-all materials-handling plan, in that he can load and unload the car with a hand or electric truck truck thus saving time of the fork truck on each floor. It is only necessary for him to convey pallet loads of materials on, or off, the car.

At Eastman Kodak, a stock clerk loads a "merry-go-round" production line conveyor. This new method replaced conventional straight line production in one department speeding output, giving greater convenience to the employees

Passenger Elevators

Passenger elevators, also, are highly-specialized pieces of equipment. In fact, it is much harder to write a specification for these than for freight elevators. First, a traffic survey must be run by a competent engineer. Such surveys involve a study of the number of passengers to be handled, the peak loads, working schedules, diversity of traffic loading, type of business, floors in the building. The manufacturers of elevators are best qualified to make these surveys, and their recommendations will be made after full consideration of the data obtained from the survey and their specialized experience in this field.

Car size will be determined by the above survey; no rule-of-thumb formula can be prescribed here to provide this information.

Special features to be considered in passenger elevator selection are: 1. Size of doors, and type of openers; 2. Speed of door operation; 3. Interior car finish, floor covering, handrail, fans, lighting, telephones, car seat, controls, etc.; 4. Car speed, size, and capacity; 5. Car position indicators; 6. Floor indicators: lights, gongs, etc.; 7. Type of control; 8. Leveling; 9. Car spacing controls (if more than 2 cars).

The penthouse design is determined by the number of hoists, type of controls, and by local or state codes. In any case, they should be well-lighted, well-ventilated, and have enough size for easy accessibility to all equipment. A valuable feature for the maintenance man is a telephone connection to the elevator cars. Another is a source of compressed air for equipment cleaning.

Pits at the bottom of elevator hatches should be well-drained and lighted, and should be deep enough to provide safety for maintenance men working in them.

Floor lobbies should be large enough to handle peak-load crowds, and should have car-position indicators installed at elevator doors. If special schedules are required, card glasses should be mounted near the call buttons. These will save confusion and improve elevator operations.

If night, or holiday, automatic service is desired, and it is not feasible to have operators on duty at all times, at least one elevator in a building can be equipped with completely automatic controls. This service will be an alternative one, and will automatically return the elevator to the floor selected when any floor call button is pushed. This feature furnishes "apartment-house" self-service to office buildings at a reasonable additional cost; it eliminates the necessity for keeping operators on a car for the occasional user who must have elevator service after hours, or on holidays.

Since elevators are so specialized, it is best to consider the features, and costs, of the several leading manufacturers before making a decision as to which to purchase. However, a selection can only be made after a complete tabulation of all features have been compiled and carefully studied.

A study of over-all plant layout is necessary to determine proper location of freight elevators, flexibility for future layout plans, availability of loading areas. Industrial trucks, too, have influenced elevator design and control

Escalators

Escalators have a rightful place in industrial plants, the same as in department stores or commercial office buildings. Their applications are limited, however, to those locations where the traffic between floors is heavy and fairly constant throughout the normal work day. As an adjunct to elevators, they can often solve a complex traffic problem in a congested building.

Normally, two flights must be installed on each floor—the two traveling in opposite directions. Some systems employ only one flight per floor, if the escalators are to be used only for uni-directional, peak load traffic. The machine is, of course,

reversed when the flow of traffic does likewise.

Escalators can be operated continuously or intermittently in factory buildings. Naturally, the less they are operated, the lower the operating and maintenance costs.

The location of this equipment is determined by the same factors that would locate elevators, unless the flights serve only a few floors. If state codes prescribe separate shafts for escalators, the location of some might differ radically from open flights and might make the installation cost prohibitive. If the plant has special features which warrant the cost of peak-load traffic-handling equipment, escalators should not be overlooked. For instance, in a plant which has a heavy concentration of personnel on the first and second floors, and a cafeteria on the third floor, escalators should certainly come in for careful consideration.

Roughly, in today's market, escalators will cost about $20,000 per flight, per floor. It is evident that this cost is considerably higher than elevators, comparing unit for unit. However, the capacities of each are quite different. An escalator system can handle approximately 5,000 persons per hour, in one direction. An average elevator can accommodate only 600 people in the same period.

Safety devices must be installed on escalators, the same as on elevators. Directional lights are also required if the equipment is reversed at different periods of the day.

Here a hoist motor has been adapted to the job of small freight elevator. Controls are fastened to the post at easy reaching height for the operator

Pallet Elevators

Pallet elevators, although of special design, are invaluable to a plant wherein unit loads must move vertically in the building. If raw materials, or finished goods, must be moved from floor to floor, and if the materials can be feasibly palletized for this operation, a consideration of a pallet elevator is indicated. This device is simply an elevator which is capable of handling a pallet load of material either up or down—automatically. Its principal advantages are: 1. No labor required to load or unload; 2. Small space requirement; 3. Comparatively low cost; 4. Completely automatic; 5. Low operating and maintenance costs; 6. Pre-selection of destination.

A typical money-saving installation of a pallet-elevator is one which is used to move palletized loads of incoming materials from a railroad receiving dock into a building, and up or down to a warehouse. Under normal conditions, such materials would have to be moved by trucks or transporters (each requiring operators) to the nearest freight elevator, and thence to the warehouse. Obviously, if the conditions are such, the cost of a pallet elevator would be quickly amortized.

The unit-loads to be handled by a pallet elevator must be of approximately the same size, and upon the same size pallet. The loads can be pushed by hand, onto the elevator, on a section of roller conveyor. Or, if the roller conveyor has the right pitch, the loads will automatically roll into the elevator. A trip-switch on the elevator platform will then operate the controls which put the car into motion. By means of a selector switch, any floor of the building can be pre-selected as a destination for the load. When the elevator arrives at the selected floor, and comes to rest, the pallet and its load can be automatically pushed out onto the floor, on roller conveyor. From this point, it can be picked up by fork truck or transporter, and taken to its ultimate destination.

Of course, pallet-elevators are specialized equipment and are not cure-alls. However, they have a definite place in the complete scope of materials-handling devices. One installation in a war plant, at a total cost of about $10,000, paid for itself in six months, and saved the cost of a new freight elevator, plus a fork truck, plus the expense of two additional operators per shift.

Spiral Conveyors

Spiral conveyors serve a definite purpose in vertical transportation, if the flow of materials is downward. The application of this type of equipment is indicated where the item of material to be handled is in cartons or boxes. Spiral conveyors, and chutes, have been in use for many years; and, like certain other elementary devices, they are still the proven work-horses of industry. When properly designed, they will satisfactorily move loads from one floor downward to other floors of the building safely and automatically. Floor-selector-scoops will slide the packages out onto any desired floor landing. Since spiral-conveyors are one-purpose units of equipment, careful consideration must be given to their selection and installation.

Dumb Waiters

Generally, dumb-waiters are thought to be restaurant, or apartment-house, equipment. Probably they were first designed for such installations, but many ingenious applications have been found for them. Originally, the motive power for dumb-waiters was the muscle of the person using it. This, too, changed with the times, until today one finds general application of motor-operated lifts which do a multitude of labor-saving jobs. But, like the spiral conveyor, this piece of material-handling equipment is very limited in application. It is mentioned only for the purpose of calling to mind another vertical-transportation adjunct. And its relatively low cost makes it something to gamble with; if it serves as a money-saver for a few years, it can be abandoned economically.

Ramps

Multi-story buildings have long employed ramps as a means for handling pedestrian traffic between floors. Ramps are used in some plants for handling the movement of freight traffic, too. However, unless the grade of the ramps is slight, and under 4 per cent, trouble will be experienced in the operation of fork trucks or tow-trucks. Manufacturers of fork trucks frown on the use of ramps because the drain on batteries is so great. In any case, foot-traffic and truck-traffic should not be permitted on the same ramp. The safety hazard is too great.

Garages have used ramps for years as a means of moving cars between floors; hospitals find ramps convenient for moving patients vertically. Factories find good use for ramps in handling heavy inter-floor traffic, and as fire-escapes. In any case, the floors of ramps must be of a non-slip material, and the ramps must be well-lighted. The safe slope, or grade, of a ramp to be used for foot-traffic is a maximum of 10 per cent. Hand rails should be provided on each wall, as a factor of safety. Traffic safety signs must be installed, also, to prevent accidents to personnel.

Ferris-wheel elevators provide a means for vertical movement of materials in multi-story plants, also. This equipment consists of a sprocket-wheel shaft on the top floor and one on the bottom. Around these shafts run two link-chains, to which are attached a number of cars, or

(Continued on page 88)

Photograph: Westinghouse Electric Corp.

Fig. 1. Model of the furniture plant of Lane Company, Inc., Altavista, Va. Additional floors or buildings, and rearrangement of existing facilities are made in model forms, such as this one, years ahead of actual construction. Long-range planning is thus set up as a realistic objective towards which all short-range layout changes are directed

TECHNIQUES AND TYPES OF INDUSTRIAL PLANT LAYOUT

By **A. T. GAUDREAU**, President, Gaudreau-Rimbach & Associates
and **R. W. MALLICK**, Executive Dept., Westinghouse Electric Corp.

MUCH OF THE WORK of actually developing a layout of machinery and equipment is of a "cut-and-try" nature. Templates representing the machines are cut to scale and are tried in different arrangements and locations on the floor blank. In arranging these templates to form a layout of the flow of operations, the prime objective is to select the *basic type of layout* that will best suit the operations. Will the flow of production be laid out on a *product basis*, as in mass production, or will it be aligned on an *equipment basis*, as in job-lot manufacturing? The ultimate selection of the best plan, insofar as the choice between a product flow or an equipment flow is concerned, however, is not made by merely shuffling templates over a floor blank.

Four Planning Media

Each year American industry invests millions of dollars in new plant facilities or in plant alterations. The plans for these huge investments usually take form by application of one or more of four accepted planning media; (1) block templates, (2) two-dimensional templates, (3) three-dimensional scale models, and (4) template-model combinations.

As the limitations of the block template system of layouts became more apparent early in our industrial history, and the need for more accurate layouts increased, the desirability of a more practical template led to the development of the two-dimensional template.

The two-dimensional template is basically a small-scale outline of the plan view of the machine, including all contours and containing principal outlines taken at a height of 7 feet above the floor. Clearance allowances, such as table travel, are dotted in on the template as required.

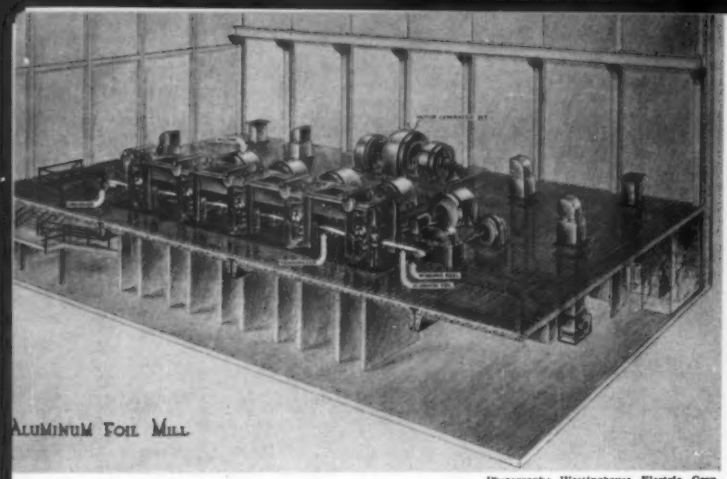
The increasing complexity of plant arrangement has given rise to the need for the greater accuracy possessed by the two-dimensional template. Planning requirements such as unobstructed traffic movement through the aisles, adequate space for work in process, and allowance for material-handling equipment of the immobile type, such as conveyors, is now receiving due recognition in plant layouts. Furthermore, with templates representing skids, trays, storage areas, etc., the large amount of setdown space required in some industries can be readily computed. Through the medium of these templates a clear distinction is made on the layout between the floor space occupied by machinery and equipment and that which is left available for other purposes.

The marked improvement brought about in plant layout practice through the introduction of the two-dimensional template is attested by its widely accepted use today. Nevertheless, this template is still only an unrealistic medium of illustration used in drafting-board technique. A wide gap exists between what the template purports to represent on an engineering drawing and the image it actually brings up in the minds of top executives. This is particulary true of those executives who have not had the opportunity or inclination to acquire a thorough familiarity in reading blueprints.

To overcome these limitations, plant layout engineers began developing miniature scale models of machinery and equipment about the time of the outbreak of World War II. The early models were hand-carved out of wood, to the scale of ¼ inch = 1 foot, and were both crude in design and expensive to produce.

It was not long, however, before precision-scaled models cast in metal were introduced. The lower cost, greater accuracy, and stronger eye appeal of the cast-metal model promptly gained favor for it over the wooden model. Cast-metal models of most types of standard machinery and equipment plus many types of special machinery, are now available on the market at advertised prices.

With the introduction of these scale models, plant layouts at once assumed depth and reality non-existent in the flat-template medium. Now, with scale models, it is



Photograph: Westinghouse Electric Corp.

Fig. 2. Perspective drawing of a proposed rolling mill for aluminum foil. It is easy to visualize finished plants or rooms by this method of presentation and the cost of a perspective drawing is usually much less than that of a model

possible to move tiny figures of men and machines around in miniature factories. Metal models, molded for permanency and accuracy, form a "bank" from which plant layout engineers may draw to plan their tiny industrial domains. In these banks is a supply of each type of machine and equipment used in the factory being laid out.

Sufficient detail is reproduced in the cast-metal model to make the represented machine easily recognizable as to type, size and manufacturer. These models are usually scaled ¼ inch to the foot and are designed in accordance with national standards, recommended by the American Society of Mechanical Engineers[1].

Models alone are not sufficient for the plant layout engineer to design a proper layout. Since the layout must be converted eventually into an engineering drawing for record purposes, the model arrangement by itself leaves much detail work for the draftsman to do. A combination of two-dimensional templates and three-dimensional scale models consolidates the best features of both media. Under this combination plan, the layout arrangement is made with the models. To the base of these models are attached, with double-faced adhesive tape, the corresponding templates showing all clearances. When the desired layout arrangement has been achieved, the templates are affixed permanently on the layout, by means of staples or adhesive tape, and the models are removed for reuse on other projects.

The marked effectiveness of scale models in developing plant layouts is illustrated in Fig. 3. Here, a complete layout is viewed looking down through the roof trusses. The layout shows railroad sidings, incoming materials, machinery, equipment, and the building structure.

Co-ordinate paper instead of architectural floor plan was used for the base. This substitution is optional. Co-ordinate paper facilitates the calculation of locations of equipment by means of the scaled, printed squares. Architectural floor plans, on the other hand, are more realistic in that they contain engineering information and thus save time in ultimately drafting the final plan.

There are four stages recommended in developing a plant layout by means of scale models and two-dimensional templates. These stages are: 1. **Working tools.** Blank floor plan, template sheets, and scale models are obtained for the layout; 2. **Realistic view.** Models are placed on the floor plan to set up a preliminary arrangement of machinery, equipment, furniture, workers, etc. At this stage the layout can be viewed in three dimensions, and suggestions invited from interested parties; 3. **Template laydown.** After the models have been placed in tentative positions, corresponding templates are slipped under the scale models to show the necessary clearances and data, such as dimensions; 4. **Completed plan.** When final arrangement has been decided upon, the models are removed, and the templates are cemented on the floor plan ready to be photographed or traced on the final drawing.

In making a layout with templates, models, or a combination of both media, it is necessary to provide sufficient output capacity at each work station to take care of the production traffic, without interrupting the flow of production with bottlenecks in some stations or building up overcapacity in others. The synchronization of work-station capacities is perhaps the most important function of plant layout work at this stage. The importance of this provision cannot be overemphasized.

The proper type and quantity of machines, cranes, conveyors, elevators, work-benches, etc., called for in the production estimates, are all shown in the layout. These production estimates also form the basis for determining the amount of bin and storage capacities to provide at dispatch stations and in storerooms. Arrangements are made with the production department at this point to set up an adequate production-control system which will fit the layout. This system should also make

[1] ASME Standards for Plant Layout Templates and Models is obtainable from The American Society of Mechanical Engineers, 29 West 39th St., New York, N. Y., for 40 cents a copy.

Photograph: Gaudreau-Rimbach & Associates, Inc.

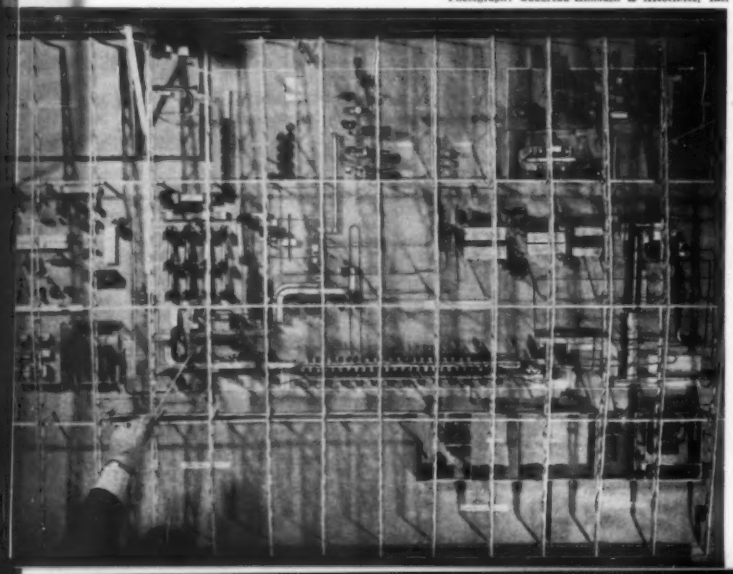


Fig. 3. A complete plant layout made with three-dimensional scale models ¼ in. to the foot. Checkerboard effect is from the roof trusses. Note the shadows created by the models, the alignment of the machinery and equipment, conveyors, aisles and open floor

possible the realization of the proper functioning of the layout when production actually flows through it.

The templates or models are placed in operation sequence for a layout on a **product** basis, or in groups of like machines for a layout on an **equipment** basis, depending on the type of layout selected.

The flow of production is traced through strategically located dispatch stations, machining areas, assembly areas, stock storage, and shipping platforms. Aisle spaces, building dimensions, clearances, and facilities are determined on the plan before the layout is ready to be submitted for the approval of different members of management.

This is also the point where meetings are held with the interested departments and sections to assure them that their requirements have been adequately provided for. Complete approval of the general design should be obtained before turning the job over to the draftsmen.

These meetings often involve contacts with outside suppliers of machine tools, material-handling equipment, and other facilities called for in the layout. When all the ideas about the layout have been reconciled, or as nearly so as practical, the layout is released to draftsmen for recording on drawings. In all these considerations, it is important to bear in mind that the greatest single item of manufacturing cost, material handling, is at the root of all plant layout work and should be ever recognized as a major deciding factor in designing the plan.

Drafting Technique

The layout is received in template or model from the plant layout engineers ready to be approved and drawn up in final detail on regular plant layout drawings. It may also be necessary for the darftsmen to prepare the drawings of production flow charts, area allocations, bin designs, storage-rack designs, and skid designs, as well as cross-sectional and detail sketches when required for a specific layout.

The draftsmen also check the plant layout drawings with the dimensions used on the construction drawings which may be available at the time. It must be noted, however, that, since plant layout drawings must be drawn up in advance of construction drawings, the only construction drawings that may be available at the time are those prepared for former construction projects affecting the particular building involved in the present layout.

In making plant layout drawings, the draftsmen are guided by a code of standard instructions on drafting technique as regards the sizes of drawings, type of notations, identifications, cross-references, legends, lettering, symbols, etc. Depending on the project, the draftsmen also incorporate in the floor plans of storerooms, tool cribs, and dispatch stations a complete numbering system for storage-bin compartments, floor storage areas, aisles, etc. They also identify each work station alphabetically or otherwise to permit cross-reference in summary reports covering the project.

In support of all plant layout drawings, material and work schedules are prepared and are either attached to or incorporated in the plant layout drawings. Complete specifications are given for each item on this schedule form. Also accompanying the drawings are perspective views and wall charts as needed.

Just what information should appear on a layout drawing has not yet been prescribed in the form of standard practice. Too much drawing and too many lines tend to complicate the drawing and confuse its interpreters. Insufficient detail, on the other hand, causes unnecessary lost time and errors in reading the drawing, and wasted time in "doctoring" it up later. The minimum data which every layout drawing should contain usually include the following 14 items:

1. Title and scale of the drawing.
2. Sketch number.
3. Approval space.
4. Detail notations for use of plant engineer.
5. Construction notations for architects and detail engineers.
6. Notations on heating, lighting, ventilation, and communication facilities.
7. Directional locations and orientation on plant site.
8. Transportation and handling facilities.
9. Overhead obstructions, and obstructions below floor levels where foundations or superstructures are necessary.
10. Machine-tool and equipment identification numbers.
11. Column numbers.
12. Service outlets for gas, electricity, water, air, and other utilities.
13. Fire protection and other safety apparatus notes.
14. Signature and date.

With this information appearing on a layout drawing, the drawing can be used as a dependable guide for building design and construction and for the installation of machinery.

Perspective Drawings

In presenting a layout for the purpose of discussing arrangements with shop supervisors or with management executives, one of the most common and difficult problems is to convey a clear image of the project in the minds of all concerned, as previously pointed out. However masterful and accurate single-plane drawings may be, they inevitably lack depth and height. Architects have succeeded in overcoming much of this shortening through the technique of perspective drawings.

A drawing of this type used for a layout of an aluminum foil rolling mill is reproduced in Fig. 2.

Miniature Plants

The medium generally considered and acclaimed as the best developed thus far for providing ready visualization of a layout project is the miniature plant. This is a three-dimensional model generally made to the scale of ¼ in. equals 1 ft. Figure 4 shows a minature plant for the layout of an automatic molding and casting installation in a foundry. An attempt to make a plan view of this installation on an engineering drawing, for the purpose of providing a clear image of the project, would of necessity result in an unintelligible maze of intersecting lines.

The material in this article was condensed, by permission, from Plant Layout, by R. W. Mallick and A. T. Gaudreau, to be published early in 1951 by John Wiley & Sons, Inc.

Photograph: Westinghouse Electric Corp.

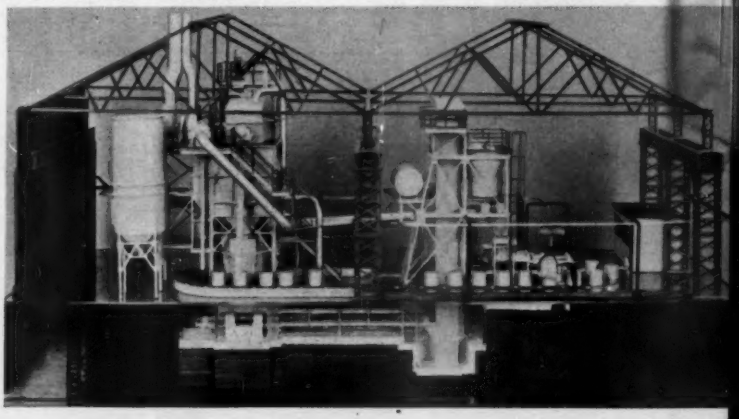


Fig. 4. Miniature plant is sometimes the best way to show complex plant layouts. This is the application of three-dimensional scale models for the layout of an automatic foundry installation

General Electric Company's new measurements laboratory at Lynn, Mass., is a five story steel and concrete building containing 142,000 sq ft of floor space. This view of one of the laboratory's work areas shows the conveniently located taps for hot and cold water, vacuum and other services. Each of the three major sections into which the lab is divided — Advanced Engineering, Materials and Processes, and General Service — is composed of separate, smaller laboratories and work areas, which are completely equipped and self-contained

Utilities Can Be "Had" at G.E.'s New Laboratory

Unlimited mechanical and electrical services are available to all engineering specialists and technicians working in the new lab. These services are "piped-in" to all work areas by means of bus ducts and pipes suspended from the corridor ceilings. Mechanical services include hot and cold water, vacuum, process steam, nitrogen, oxygen, high pressure air and city gas. Electric power for general use includes direct current at 125 volts, and alternating current at 240 volts, 3 phase and 208/120 volts single phase. In the photo a technician switches an electrical connection adjacent to "hot, cold and humidity" instrument testing areas

Development engineers in the lab work in semi-private cubicles equipped with work benches which are easily accessible to all mechanical and electrical services. "Bread board models" of new instrument designs are developed here. Adjacent to the small cubicles are small-scale machine shops equipped with bench lathes, drill presses and other machine tools for the actual construction of the models of new instrument designs. Once built, these models undergo rigid examination and a test at the hands of development engineers in specialized laboratories equipped with apparatus designed for the precise branch of measurement involved

How Water Supply Treatment Improved Plant Operations

Why the entire plant water supply is treated . . . Corrosion and scale problems . . . Extent of water supply system . . . Importance in relation to plant operations . . . Water storage . . . What treatment promised and what it accomplished . . . Chemical feed and control equipment and procedures . . . Operation and maintenance . . . Costs

By PAUL H. HALE, Plant Engineer and R. C. DICKSON, Power Dept. Head, Phelps Dodge Refining Corporation

NEARLY EVERY plant engineer has had the sad experience of a failure to a water main with the resultant frenzied labor to dig out the line, repair it and return it to service as soon as possible. Usually water mains and connecting lines are buried deep under ground and quite often, as in our particular case, certain portions of the lines are laid under heavy building and equipment foundations.

In addition to the usual serious problem presented by a ruptured water main in an industrial plant, a copper refinery must have an unfailing water supply for the furnace jackets, water cooled skewbacks, pads, conker plates, and doors in the wire bar and anode furnaces. Failure of this water supply during operating periods of the furnace cycle could have very serious consequences.

The water system in our El Paso Refinery consists of nearly 2 mi of underground mains and branch lines, ranging in size from 16 to 4 in. with many additional thousands of feet of small connecting service lines. These lines are standard black iron pipe containing a normal water pressure of approximately 30 psi. On occasions of emergency or in the event of a fire in the plant, this pressure can be boosted to 125 psi by the use of auxiliary pumps.

Water is furnished from three deep well pumps each with 750 gpm capacity. This water is delivered directly into the mains and to storage. Storage facilities are provided for 1,000,000 gal, adequate for our consumption of approximately 2,000,000 gal per daily operating period of twenty four hours. Figure 1 shows the general layout of the water system indicating the size of the lines and location of wells and storage tanks.

Failure of one 6 in. main some time ago caused great concern to the management and staff. Close examination of the ruptured main showed that failure had been caused by internal corrosion rather than external means. Since our water system at that time was nearly 17 yr old, it was imperative that we take immediate steps to protect the system against further corrosion.

Protection of the main water system was our foremost concern but we had a secondary condition which had caused considerable trouble and delay to furnace operations. The water passages of the water cooled pads, skewbacks, conker plates, and doors of our furnaces would become coated with heavy scale deposits. These deposits would build up to such a thickness on the inner surfaces of the jackets that the metal surface would be insulated from the cooling water.

When this occurred, the furnace heat (2400 F) would cause the metal to blister and rupture much in the same manner as a boiler tube failure. A typical cross section showing the failure of a skewback is shown in Fig. 2. Repairs after failures of this nature were difficult and costly. The furnace had to be cooled down quickly with resultant damage to brick work. Temporary brick protecting walls had to be built into the furnace in front of the damaged jacket to permit workmen to make the repairs. The damaged portion of the jacket had to be cut and a new piece of metal welded into place.

Since our furnaces normally operate on a 24 hr cycle, delays in furnace operations disrupt working schedules not only in the furnace department but in all other departments having interconnecting work phases. Usually, furnaces are shut down at yearly intervals for major repairs to the brick work. During these major overhaul periods, we would attempt to remove accumulated scale deposits from the furnace jackets by pumping a weak solution of muriatic acid through each water passage, but favorable results were doubtful.

We had been using boiler feedwater treatment for some years, but we had not considered the possibility of treating the entire water

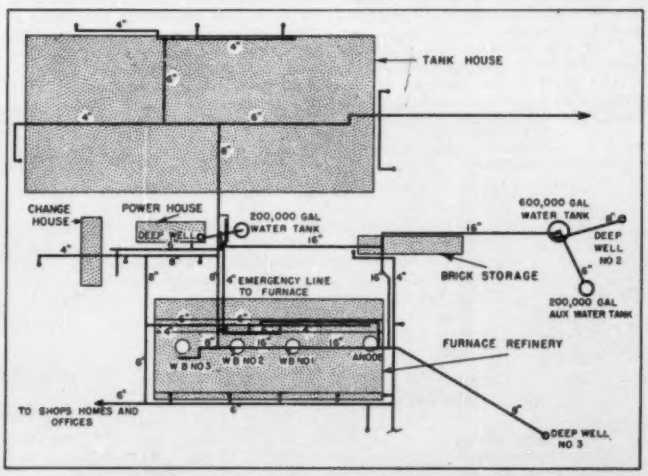


Fig. 1. Layout of water system showing water mains, storage tanks and deep wells

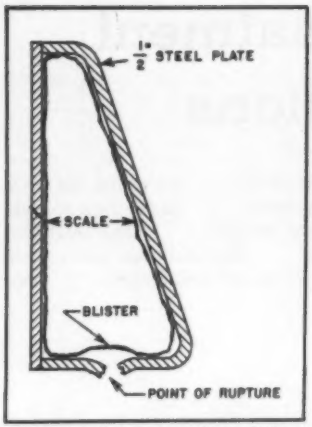


Fig. 2. Typical cross section of skewback showing the type of failure due to scale accumulation. Water treatment has since eliminated this serious trouble

supply. Previously, cathodic protection had been provided for the storage tanks but it was increasingly evident that some means of protection of the entire water system must be provided. The problem was presented to Hall Laboratories, and after much discussion relative to costs of installation, operation, and maintenance, it was decided to install the Threshold method of treatment.

We were assured that; the treatment would provide positive protection against further internal corrosion; would clean out existing blister accumulations in the water system; but that complete elimination of scale formations in the furnace jackets was doubtful. Previous tests indicated that the results are not always predictable where high temperatures are involved.

This treatment has been in use in our plant since August 1946 and results have been very successful. Examinations show that active corrosion has been stopped in our entire water system and there are no indications of renewed activity. The results obtained in the elimination of scale deposits from our water cooled furnace jackets have greatly exceeded our expectations.

Treatment has not only stopped further formation of scale deposits but has dissolved the existing deposits so that the various furnace jackets are in better condition than they have been in many years. We have not experienced a single failure to this equipment since the treatment was started. Also, we have discontinued the use of acid for cleaning out scale deposits because this source of trouble has been eliminated entirely.

In order to obtain the best results from the Threshold treatment, minute quantities of chemicals (hexametaphosphate) should be introduced to the water supply at a uniform rate, and in a manner so as to secure uniform distribution to the entire water system, including the storage tanks. The feed system as shown in Figs. 3 and 4 was considered to be the best type for our requirements.

Note that the chemicals are mixed in a storage tank and fed by gravity to a constant level tank controlled by a float valve. The chemical then flows into the intake of the pump suction tail pipe. The flow of chemical feed is controlled by a solenoid valve which opens only when the pump is running. This method provides a very uniform feed to the water supply and uniform distribution to the entire water system of the plant.

Feed Rate Cut

In the beginning, the rate of chemicals fed in proportion to the amount of water pumped was fixed at approximately twice the normal requirements. This was done to secure rapid protection for the lines and stop corrosive action. This rate of feed was continued until analysis showed stability, a period of approximately a month.

After the initial period of treatment, the feed rate was reduced to 3 ppm so that the analysis of the water after passing through the lines would show some excess phosphate.

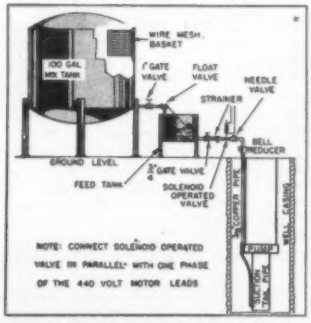


Fig. 3. Drawing showing equipment for feeding chemicals to the water system

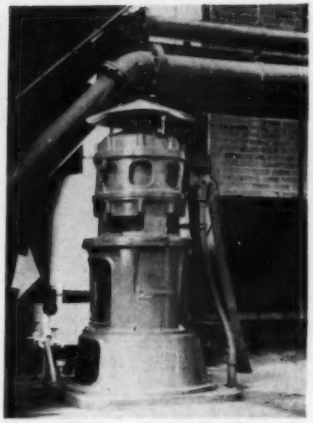


Fig. 4. Photograph showing the equipment as used for feeding the chemicals. Mixing tank, constant level tank and control valves are shown behind pump

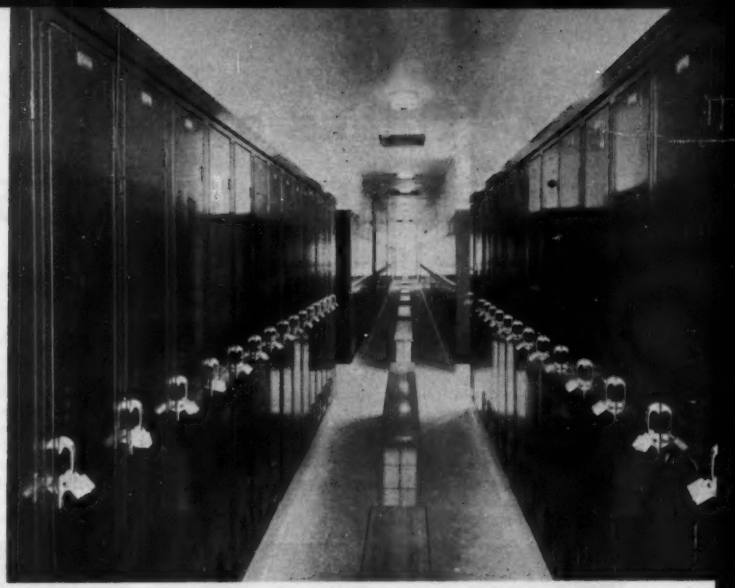
Analyses were made of the treated water samples taken at various points in the system, including the location most distant from the point of feed and at the highest temperature of discharge from the furnace jackets. A composite of all of the samples which were taken is also analyzed. Typical results are tabulated in Table I. The results of these analyses show that the system is now being kept in excellent balance with a small amount of phosphate in excess.

Operation and maintenance costs of the treatment are nominal. We have not made any great effort to determine the exact amount of savings effected by the treatment because many intangibles are involved, but we are certain that the excellent results obtained have more than repaid the costs. It is sufficient to state that one single failure of a large main in our water system, with resultant delays to plant operations and possible damage to valuable equipment, would probably offset many times the yearly cost of the treatment.

Table I. Analysis of treated water samples taken from various points in system

TEST		POINT FROM WHICH SAMPLE WAS TAKEN		
		Most Distant	Highest Temp.	Composite
		All readings (except pH) are shown in ppm		
Bicarbonate	(HCO_3)	136	134	138
Carbonate	(CO_3)	0	0	0
Chloride	(Cl)	171	168	171
Sulphate	(SO_4)	Tr	Tr	Tr
Silica	(SiO_2)	-	-	-
Soap Hardness	($CaCO_3$)	95.7	90.6	95.7
pH		7.81	7.83	7.78
Total Phosphate		1.0	0.8	0.8
Ortho Phosphate		0.6	0.1	0.2
Meta Phosphate		0.4	0.7	0.6

Locker Rooms With a Heart



Camera view down a locker corridor in the new Employee's Facilities Building

A BASIC LOCKER room plan embodying high functional and mechanical efficiency has been used by The Rust Engineering Company for several years in a number of its industrial plant designs with only slight modifications.

The primary concept is a centralized sanitary core—a plumbing access well, 3 ft wide, which contains all the necessary supply pipes, drains, vents and ventilation for the sanitary fixtures which are attached to the walls of the double-partitioned core.

These fixtures—lavatories, urinals, water closets, drinking fountains and showers—are grouped in four divisions around the mechanical core so that there is easy, direct access to all types of fixtures from any quarter of the locker room.

Besides providing convenient fixture distribution, this grouping provides greatest possible economy in installation and maintenance costs with maximum use of required plumbing facilities.

An example of this type locker room may be found in the Employee's Facilities Building of the Crossett Paper Mills, Crossett, Ark. All fixtures are wall hung. Although the basic plan calls for ceiling hung partitions to facilitate floor sanitation, in this case conventional floor-type toilet partitions were installed.

Stainless steel footrests, long pipes bracketed to the walls, were placed at either end of the showers instead of the usual benches so there would be less lounging in a wet condition. Also the room-tempered air and radiant heating coils in the floor slabs give most healthful conditions possible and greatly mitigate any tendency to take cold.

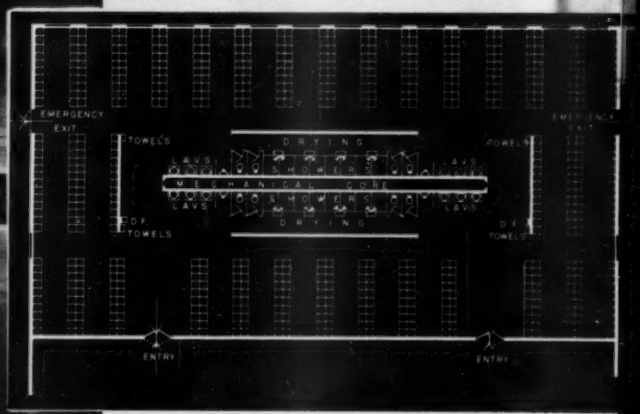
Filtered air is pumped into the lock room through ceiling outlets and exhausted through each locker. Each locker is thus positively ventilated by air movement inward through slots at the bottom of the door, and outward through individual ducts at the top. Maintained at constant velocity, this air has a drying effect on the clothes hung in the lockers. It also serves to deodorize and remove stale smell from clothing which might occur in unventilated storage.

The 860 individual lockers at Crossett are set so that plastered walls above them are flush with the faces of the lockers. The walls join with a plastered ceiling to conceal the ventilation ducts.

The plumbing core and other exposed wall surfaces are of ceramic glazed tile in subdued colors. Natural lighting is furnished through aisle-wide glass block panels reaching from base to ceiling at the end of each locker corridor. There is no sash, consequently no contaminated air enters the room and locker room odors are exhausted to give ideal atmospheric and utilitarian conditions.

Left: Sanitary fixtures outside the mechanical core

Below: Basic plan of Rust's locker and toilet rooms



Don't Guess on STORAGE BATTERY REPAIR

By J. E. VAUGHAN, Manager, Field Engineering, Gould-National Batteries, Inc.

THE PHOTOS AND captions pretty well tell the story of storage battery repair; however, additional words of caution may be helpful:

When removing an extremely tight element, Fig. 4, sometimes the jar will lift from the tray instead of the element from the jar. If it does, sometimes it is necessary to heat the jar to expand the rubber.

When refilling with electrolyte before placing the battery on charge bring the level only to the top of the baffle plate to avoid overflow. More electrolyte can be added if necessary after charging.

If jar is broken and no replacement is immediately available, immerse complete element in water in a rubber, glass or porcelain container to prevent drying out.

Repaired cells should have a separate charge and, if possible, be connected to the circuit when the battery is discharged so that it will be charged when the battery is placed in service. In returning the cell to the circuit the posts of the repaired cell are, of course, connected to posts of opposite polarity in the adjacent cells.

When welding connectors back in place an acetylene torch or carbon burning outfit may be used. If the

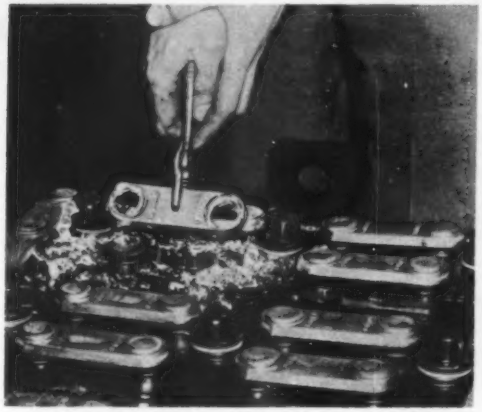


Fig. 2. After the intercell connectors are drilled they can be lifted off. The hard rubber jar can then be removed. The cover is sealed to jar with compound which must now be cut

Fig. 3. A heated putty knife will cut compound. Place knife blade adjacent to wall and push below lower edge of cover, 7/8 in. under top and run the blade from corner to corner

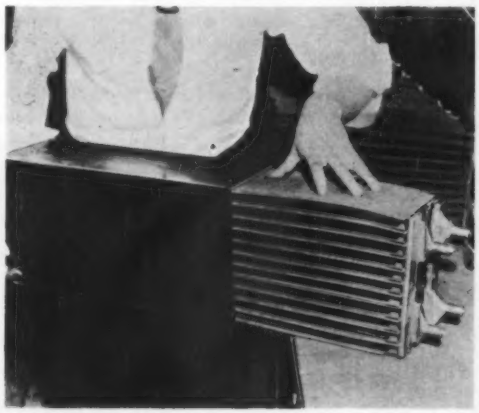


Fig. 6. Spilled acid may be neutralized with a weak solution of ammonia, or baking soda and water. After element has been replaced in its jar, the jar is then put in the battery

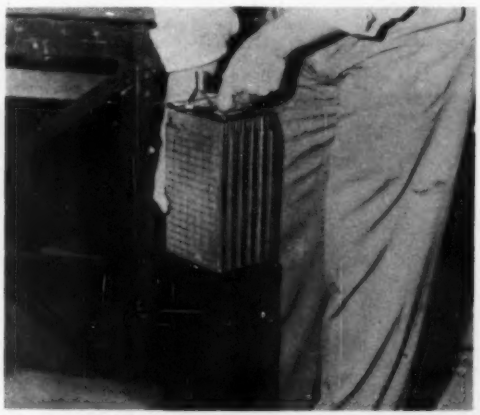


Fig. 7. Next, after the jar is put in the battery, the cell cover is replaced and sealed in place. Before sealing, the surfaces are thoroughly cleaned. They are then sealed with tar

former, it is necessary to weld the post, cover and connectors together and then, while the center point of this weld is still hot enough to flow, add additional burning lead to build up the connectors to their proper height.

The carbon burner utilizes 6 volts or three cells for its power. The burning tool may be connected directly to the battery being worked upon. The carbon rod has a pencil point extending about 1½ in. with approximately ⅛ in. tip. When possible the carbon burner is connected to the battery so that the carbon is of negative polarity. This tends to keep the working surface clean.

The tip of the carbon is placed directly in the center of the post and held there until it heats to a cherry red. Then the carbon tip is gently moved around the top of the post to cause the entire top of the post to become molten. During this operation the carbon will become white hot. The clean end of the burning lead is placed against the carbon while the carbon is still in the center of the post, and a small amount of lead added. The lead, touching the hot carbon, melts and runs down into the working point, fusing with the molten lead at the tip of the burner. Then the molten lead is "tacked" to the wall of the connector, the tip of the carbon being used for this purpose. After the molten lead at the top of the post has been joined to the walls of the connector, addi-

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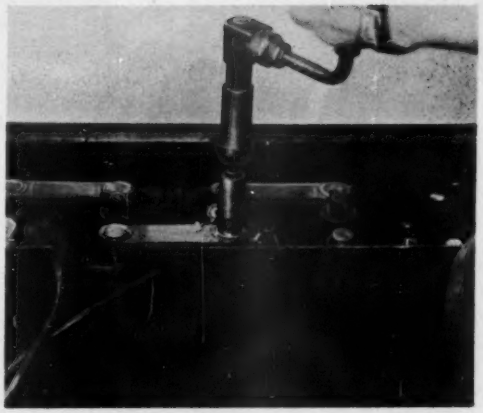

Fig. 1. Assembled cells have lead cover insert, cell post and intercell connectors welded together. To remove cell, drill into post center for ⅜ in. with 5/16 in. or a special drill

Fig. 4. L-shaped tool inserted in vent hole helps removal. Pull should be steady to prevent breaking cover. If old cover is to be reused, remove compound and other foreign matter

Fig. 5. Damaged separators (which result in internal shorts) must be replaced at once and element installed in its jar with sulphuric acid. If jar is broken, neutralize the spilled acid

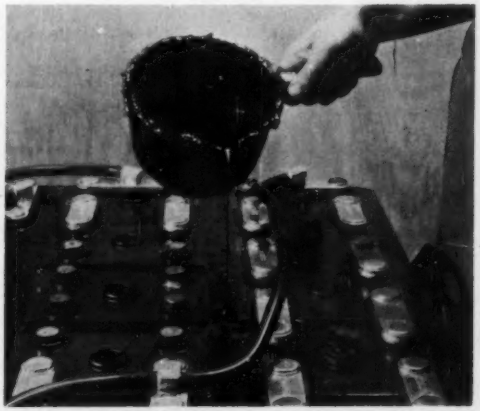

Fig. 8. When sealing with tar it is important that the sealing be brought to the same level as the surrounding cells so that no recesses are formed on the top where acid may collect

Fig. 9. When "reburning" intercell connectors be sure post, cover and connector are clean. Next, remove vent caps and clear gas out by blowing into cell with mouth before reburning

A close-up view of the technique of skilled operators such as this one, can be had by dozens or even hundreds of trainees, instead of the usual three or four

TELEVISION in Industry

Dangerous atmospheres, high temperatures, inaccessible places must now yield their secrets to industrial television. . . Colored or black and white television available in closed circuit systems

SOMETIMES called the electronic wonder child of the Twentieth Century, television is becoming increasingly popular. It has even been put on the industrial payroll.

In its closed-circuit form it has found many and varied applications in industrial plants, offices, schools and hospitals. It has been used to safeguard human life, to monitor production lines, to permit visual observation of hazardous processes and to stand guard in locations where human presence is impossible for reasons of space, temperature, high voltage, poisonous fumes or other conditions. Because images produced by this type of equipment are transmitted entirely by coaxial cable, instead of broadcast, closed-circuit systems require no Federal Communications Commission license.

New uses of TV are being pushed ahead in a wide range of manufacturing plants in three principal branches of industrial operation —direct observation of points of use of critical high speed tools used in production work; analysis of safety conditions at hazardous work sites; check-ups on work flow at "bottlenecks" in materials handling.

Industries in which worth-while applications have been made include: power plants, coal mines, steel mills, machine shops, chemical plants, nuclear energy plants, automobile manufacturing and household consumer goods manufacturing. Case studies of installation show that costs of operation are almost negligible, compared with the increased output of production which is obtained. Televised views of shop work for foremen training classes also have proved highly successful and TV has been used to give plant visitors close-up views of hazardous operations, while keeping them at safe distances.

A most important development

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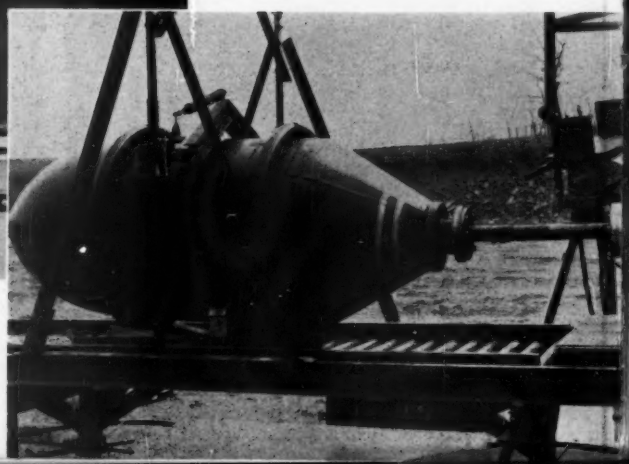


Photos, this page, Remington Rand, Inc.

Above: De-fusing operation as viewed in a shelter

Right: Camera on remote control de-fusing wrench

For Example: At Fisher Body

EVIDENCE of the opportunities that exist for the expansion of television into the industrial field may be seen at the new Fisher Body Pittsburgh plant, where one of the first applications of its kind is in successful operation.

The plant is equipped with a transmitter and receiver consisting of two monitors, one camera and one power unit which is used to expedite the loading of scrap into railroad cars. The equipment enables the operator of the scrap baler at all times to view the gondola scrap car located on a track outside the building.

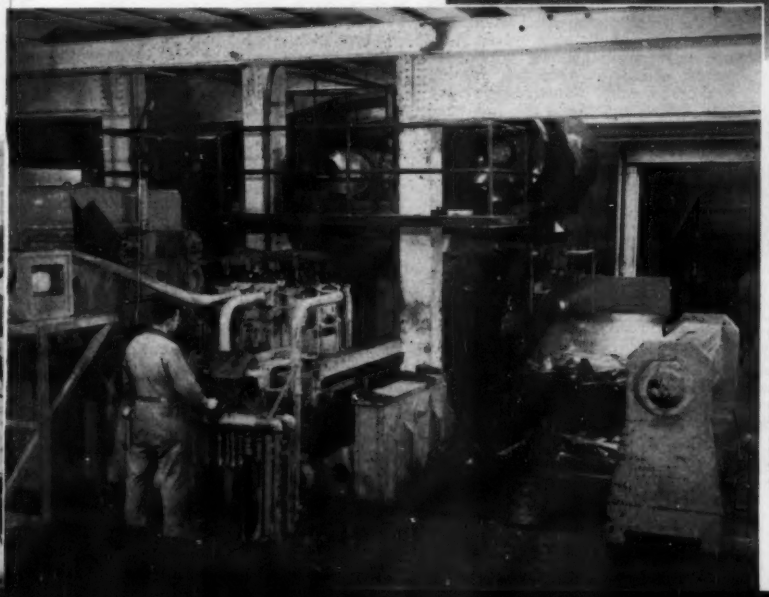
The camera is mounted on a beam extending from the southwest edge of the building roof. It is focused on the discharge end of the baled scrap conveyor. Eight 1500-watt floodlights illuminate the area.

When the baled scrap is discharged from the scrap baler to the conveyor, it is carried to a chute in which it slides down into the waiting scrap car. The picture of the car-loading operation is constantly reflected on the monitor screen allowing the baler operator to see when the car needs to be moved to fill it uniformly.

A car puller device is located at the scrap car and can be operated from the baler control station in the press pits. When the car is ready to be moved, the operator pushes a button moving to a new location.

There are two balers located in the press pit area and the television controls works from both balers.

Above: Scrap is loaded into a waiting gondola car from the chute seen above the car and beneath the lights, which are used to illuminate the area to permit television operation when it is dark. Camera can be seen at top center of picture (arrow), mounted on top of building. Installation at right is a deflector to prevent bales bouncing out



Left: A scrap baler operator stands at the control panel which governs the conveyors bringing scrap to the baling area, the basket which dumps the scrap into the powerful baler, and the conveyors which carry the baled scrap to the waiting gondola scrap cars. At his left (arrow) is the monitor screen which shows when a car is loaded and ready to be moved by automatic controls so that another car may be loaded

They Say—
at the Engineering Meetings...

Cost Savings, Better Equipment Operation with Synthetic Lubricants

IMPROVED OPERATION of mechanical equipment and substantially lower production costs are possible through extended use of synthetic lubricants where unusual or severe operation conditions are present.

In addition to their use as lubricants in various industries, these synthetic fluids are finding application as anti-foaming agents, as an addition to detergents to increase their effectiveness, and as a conditioner for nylon, glass, wool and rayon fibers.

Among these synthetic lubricants are the polyalkylene glycols and their derivatives; the consistencies of this group range from very light to highly viscous liquids. Some are water soluble while others are substantially insoluble in water.

After changing to synthetic lubrication, one eastern ceramic plant decreased tunnel kiln car lubrication failures from four or five a day to

Wheels of ceramic kiln cars, greased with polyalkylene glycol type synthetic lubricant, were subject to fewer breakdowns and seizures, it was reported

as few as one in five months. In addition, the bearings were oiled once each week instead of twice during each trip through the kiln, at a saving of $55.00 per week in labor and materials.

The good extreme pressure properties of these lubricants have been evident in certain metal working operations, being reflected in prolonged tool life and better surface finish. At times, ease of removal or suitability for further processing without cleaning is the principal advantage of the synthetic lubricant.

The cleanliness, ease of removal, stability and good lubricating properties of these fluids have also proved useful in the textile industry where they are being used in formulations, or alone, for lubricating or conditioning various fibers including nylon, glass, wool and rayon. *By T. W. Sweatt and T. W. Langer, Union Carbide and Carbon Corp., at the ASME meeting in New York City.*

High Speed Scanning of Temperatures About to Emerge from Labs

A MONITORING instrument which detects unsafe temperatures in machinery, announces the fact, and records the information, should emerge soon, in practical shape.

Various field surveys into industrial needs for instrumentation have brought to light a number of specific applications for this type instrument. The most predominant among these is the need for continual checking of bearing temperatures in rotating machinery.

Such an instrument could scan rapidly and continuously through fifty primary elements in a matter of less than five seconds. There would be no scale but it would have, instead, an array of fifty bulls eyes on the front of its case. Suddenly, one of these bulls eyes would light up and simultaneously a howler would sound. A recorder, located nearby, would immediately move into action and make the following information known:

1. That the stator of Generator No. 2 has heated up 10 F beyond its proper operating temperature; 2. That its actual temperature at that moment is 218 F, 8 degrees above its preferred maximum operating temperature; 3. That all other temperatures and pressures in the system are within their safe operating range; 4. That this information has been logged; 5. That this same temperature will be recorded repeatedly until safe operation is assured.

The operator then on duty will note, by reading the annunciator, the generator involved and will press a button to silence the howler. He then will move off to inspect the stator itself. The bulls eye remains lit and you further note that the recorder remains inactive, so you decide to watch the temperature record. It appears to be dropping back toward a safe consition as a result of increased water flow to the hydrogen cooler. Next, you notice that the light goes out and, at the same time, the recorder runs down scale and stops. *W. E. Belcher, Jr., Minneapolis Honeywell, at Fall General Meeting of AIEE, Oklahoma City.*

Planned Campaign Needed in Selling Materials Handling to Management

WHEN PLANNING a campaign to sell materials handling to management it must be remembered that management is primarily interested in operating a business at a reasonable profit. Faced with ever-rising costs on all sides, management is interested in ferreting out those avenues which will provide the greatest return on an investment.

With this in mind the engineer who is interested in selling his company's management on the value of improved materials handling must first learn to think and talk in terms most dear to this management: dollars reduction in yearly operating costs; dollars required for initial expenditure; number of years required for accrued savings to equal or exceed the investment required; per cent reduction in operating personnel; per cent reduction in storage or production areas.

Once the mechanics of a proposed system have been developed, the necessary expenditure required to achieve installation must be determined. Operating costs of existing materials handling operations must be dissected and analyzed.

A comparison of existing costs with proposed costs should then be made. It is only at this point that the "salesman" is finally able to evaluate the system proposed, determine the savings to be realized and decide what the possibilities of acceptance by management will be.

Regardless of the scope of the project at hand, if savings are anticipated, a detailed report summarizing the savings to be realized must be prepared, expressing as dramatically as possible in the above-mentioned terms, the dollars to be saved or made. *By John F. Roberts, Ozalid Division of General Aniline and Film Corp., at Industrial Management Society's National Time and Motion Study Clinic in Chicago.*

I—Metallic Surfaces

The first of two articles which tabulate in easy reference form many of the outstanding materials available for the prevention of corrosion . . . Prevention of rust, chemical corrosion, corrosion caused or accelerated by high temperatures, rust preventives for outdoor or indoor use . . . Methods of application . . . Coverage . . . Resistance

RUST IS the popular name for all types of metallic[1] corrosion; its unpopular names are many—and unprintable. It is one of the most expensive of unnecessary wastes. Figures denoting the losses are practically unobtainable, but reliable estimates place the annual cost of corrosion in industry at hundreds of millions of dollars per year.

Water in all its forms is the chief villain of the piece. It is the nearest approach to the universal solvent and it finds its way through any unguarded aperture or crack. In the form of vapor it reaches cold steel and condenses on its surface. It penetrates porous roof coatings, it stands in pools on unprotected steel work. Wherever it collects it starts the process of oxidation.

Sun and heat, snow and ice, contraction and expansion, work on weak protective coverings running interference for water vapor and chemical fumes. The plant engineer and the maintenance man are in the front line; it is their job to stop the infiltration process. In this battle they are helped mightily by manufacturers. Indeed, the battle against corrosion has enlisted many of the country's outstanding firms.

The purpose of this article is to present, not all of the materials available for preventing rust, but a few of the representative products. All told, these products will solve practically any common industrial corrosion problem. If any of the readers of PLANT ENGINEERING have special or particularly vexing problems these manufacturers stand ready to help them to a solution.

[1] The second of these two articles will appear in a subsequent issue of PLANT ENGINEERING. It will deal with protection of masonry and wood.

For Salt and Alkali Fumes

Name: Atlas Alkaloy (500 Series) Coatings.

Type: Thermosetting coating based on resins which cure through chemical change.

APPLICATION

Method: Applied by brush only.

Surface Preparation: Metal surfaces must be wire brushed to remove loose particles, and be free from grease and moisture.

Coverage: Primer—2 gal per 100 sq ft. Finisher—2 gal per 100 sq ft.

PROTECTION

Resistance: Resistant to splash or fumes from water solutions of non-oxidizing acids, salts and alkalies as well as most solvents, oils and hot water. These coatings are reported to have superior abrasion resistance.

Manufacturer: The Atlas Mineral Products Co., Mertztown, Pa.

For Vegetable, Mineral Oils

Name: Atlas Zerok (100 Series) Coatings.

Type: Corrosion-proof coatings consisting of solutions of synthetic thermoplastic resinous products.

APPLICATION

Method: May be applied by brushing or spraying.

Preparation of Surface: Metal surfaces must be sandblasted, dried and then coated immediately.

Coverage: Primer—½ gal per 100 sq ft. Finisher—approximately 5 gal per 100 sq ft.

Colors: Available in clear, black, blue, gray, green, red, white and yellow. Two-color alternate coat scheme in building up coats insures uniform thickness.

Number of Coats: May be reduced or increased depending on severity of conditions to be met.

PROTECTION

Resistance: Resistance to splash or fumes from water solutions of most acids, salts and alkalies, and vegetable and mineral oils. Not resistant to ketones (acetones), esters (ethyl acetate), nor chlorinated solvents (ethylene chloride).

Manufacturer: The Atlas Mineral Products Co., Mertztown, Pa.

For Furnaces, Steam Lines

Name: Dampney Silicone Coating.

Type: An aluminum-pigmented, high-silicone-resin content material.

APPLICATION

Method: Because of its consistency, Silicone Coating is easy to apply either by brush or spray.

Preparation of Surface: Surface should be well prepared to remove all grease, oil and other foreign matter. Surface temperature at time of application should be above 40 F.

Coverage: One gallon of Silicone Coating covers 1000 sq ft of surface.

Drying: Under good conditions the surface will dry to touch within one-half hour; under less favorable conditions within two to three hours.

PROTECTION

Resistance: The silicone resins of which the material is compounded give it heat stability for continuous exposure up to 400 F; it is heat stable up to 600 F. It is equally durable at low temperatures and entirely effective under intermittent cooling and heating. Has high water repellency with low moisture absorbence. Will withstand chemical attack well, rendering it a good material for use in contaminated atmospheres.

Manufacturer: The Dampney Company of America, Hyde Park, Boston 36, Mass.

For Boiler, Turbine Interiors

Name: Dampney's Apexior Number 1.

Type: A compound specially designed for high temperature protection.

APPLICATION

Method: The coating is applied to the interior surfaces of water-tube boiler tubes by Dampney powercoating equipment. It is applied to drums of water tube boilers, as well as to the

interior surfaces of shells and exterior surfaces of flues of fire tube boilers, by brush.

Preparation of Surface: Clean, bare metal that is dry and chemically neutral is essential to the proper bonding of any coating material. Oil, grease, dirt, mill scale, loose rust, etc., must be removed by accepted means.

Coverage: One gallon double coats from 150 to 175 sq ft of surface depending on smoothness of the metal.

PROTECTION

Resistance: Is said to be ideally suited to standby service in idle boilers. It is unaffected by chemical cleaning procedures accepted as standard by industry and performed under direction of skilled personnel.

Manufacturer: The Dampney Company of America, Hyde Park, Boston 36, Mass.

For Intermittent Hot and Cold

Name: Dampney Thur-Ma-Lox Heat Durable Protective Coatings.

Type: Two types: No. 7 Black, heat and weather resistant, effective to a maximum temperature of 1600 F; No. 10 Aluminum, primarily for sheltered locations, heat resistant to 1200 F.

APPLICATION

Method: By brush or spraying equipment.

Preparation of Surface: For No. 7 Black, when applying to old metal, remove loose deposits, apply coat and place equipment in service. Coating will act as a conditioner, penetrating and disengaging rust, dirt and old paint. After several months, or at first shutdown, wire brush and apply second coat. New metal should have mill scale removed. For No. 10 Aluminum, clean old or new metal down to clean metal base.

Coverage: No. 7, 250 sq ft to the gallon; No. 10, 300 sq ft to the gallon.

Drying Time: No. 7, on cold surface will set to touch in 12 hr. Will dry hard in 24 hr. On heated surfaces will dry hard in 8 hr. No. 10 will set to touch in 3 hr. Will dry hard in 12 hr.

PROTECTION

Resistance: Both of these materials are ceramic type developed to fuse to metals, uniting with them to form a film of high durability at all temperatures. They are described as entirely resistant to chemical fumes and to high or low heat.

Manufacturer: The Dampney Company of America, Hyde Park, Boston 36, Mass.

For Acids, Alkalies

Name: Dampney Vinyl Coatings (available as standard in clear, gray, white and black or in special colors to order).

Type: A vinyl-chloride-acetate formulation specially formulated for service where a moisture and chemical resistant protection is needed.

APPLICATION

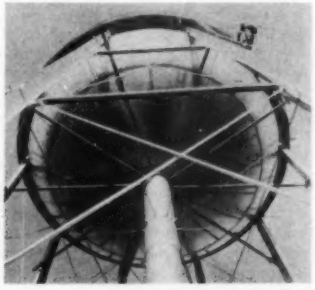
Method: Either by brush or spray.

Preparation of Surface: Any procedure that produces clean metal, free from dirt, oil, grease or rust, may be used. If any of these foreign substances are present adhesion of the coating may be affected. Old and disintegrated paints should also be removed as Dampney Vinyl Coating is not compatible with other than vinyl-resin-base materials.

Coverage: Averages 400 sq ft to the gallon.

Number of Coats: A minimum of two coats should be applied for maximum protection.

Drying: Because it dries by evaporation of solvents rather than by oxidation alone, out-of-service time is held



to a minimum and equipment may be placed in operation an hour after coating.

Rome

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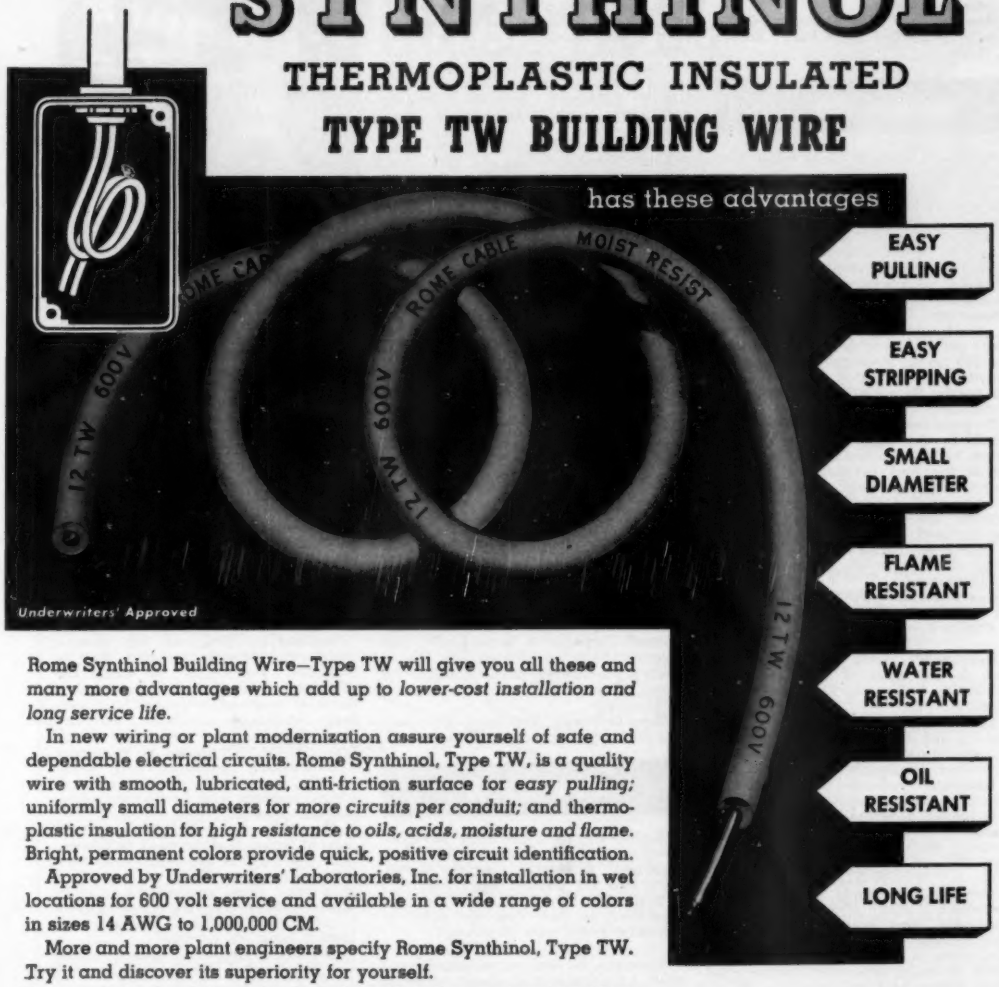
THERMOPLASTIC INSULATED
TYPE TW BUILDING WIRE



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PROTECTION

Resistance: Dampney Vinyl Coating is resistant to alkalies and mineral acids of practically any strength. It is insoluble in alcohols, greases, oils and alipathic hydrocarbons.

Toxicity: Because an applied film imparts neither taste, odor nor toxicity, it may be used on surfaces which come in contact with food, beverages and pharmaceuticals.

Manufacturer: The Dampney Company of America, Hyde Park, Boston 36, Mass.

For Tanks, Metal Joints

Name: NO-OX-ID Gloss Filler (red and black).

Type: A heavy, pigmented, paste-like product containing solvent.

APPLICATION

Method: Contains proper amount of solvent to permit hand or brush application. May be cut back with Stoddard solvent or petroleum naphtha to correct consistency for spraying.

Spraying: Consistency for spraying is considerably thicker than conventional paint but can be moved by putting 100 psi on the material line. After the material has filled the line up to the nozzle, 60 psi atomizing pressure is sufficient to spray it.

Preparation of Surface: Surfaces should be dry and free from dirt, oil, grease or other deposits. Flame cleaning is the best preparatory cleaning method although sand or grit blasting is also satisfactory. If none of these methods are possible, wire brushing may be used.

Thickness: Brush—0.010 to 0.015 in.; spray—0.005 to 0.007 in. at ordinary temperatures.

Coverage: Brush—100 to 150 sq ft per gal; spray—200 to 300 sq ft per gal at ordinary temperatures.

PROTECTION

Resistance: Gives excellent resistance to all types of water or high humidities, brine, corrosive fumes, and soils.

Lubricating Qualities: None. These coatings dry to a semi-hard consistency and should not be used on metal where lubrication is required.

Removal: Because this coating is generally used as maintenance coating, it is seldom removed. However, if removal is desired, scraping or steam cleaning methods will readily strip it from the surface.

SPECIFIC USES

General Industrial: Used for the protection of metal wherever a dry-to-the-touch, firm coating is required. May be used for wood to metal joints, as a sealer in metal to metal joints, interior of brine tanks for Zeolite systems, gutters and eave troughs, etc.

Manufacturer: Dearborn Chemical Co., 310 S. Michigan Ave., Chicago 4, Ill.

For Water-Holding Equipment

Name: NO-OX-ID "A-Special" and "A-Special X."

Type: Soft, grease-type rust preventive, containing a solvent for ease of application. "A-Special X" is the same as "A-Special" except for its black pigmentation.

APPLICATION

Method: Designed for brush application, or by swab or glove. Can also be applied by spray in several ways.

Surface Preparation: Clean rags only are needed where wiping or dusting is necessary. Rags soaked in kerosene should be used for light dirt removal on production parts. Wire or power brush should be used where rust deposits or loose paint films must be removed by abrasive action over large areas. Sand, shot or grit blasting should be employed on heavy rust deposits and scale firmly attached over large areas. Flame cleaning is an alternate method for the removal of heavy rust or mill scale over large areas. Steam cleaning can be employed where thick grease, tar or other organic deposits are present.

Thickness: Average—0.010 to 0.015 in.; 100 to 150 sq ft per gal.

PROTECTION

Resistance: Maximum resistance is obtained against high humidities, water immersion, outdoor weathering, and corrosive atmospheres in general. In maintenance, "A-Special" is used wherever corrosion problems involve nuts and bolts, structural steel, steel water tanks, electrical equipment, equipment in storage or in service.

Fire Hazards: Contains solvents with minimum flash point of 100 F.

Removal: Where it is used for maintenance purposes it is generally not necessary to remove the coating. Where desired, the coating can be touched up where it has worn thin due to abrasion or exposure.

Manufacturer: Dearborn Chemical Co., 310 S. Michigan Ave., Chicago 4, Ill.

For Structural Protection

Name: Drying Resin Type NO-OX-ID Coating (4-C, clear; 4-CX, black; aluminum protective coating, aluminum; and 5-C Primer, brick red).

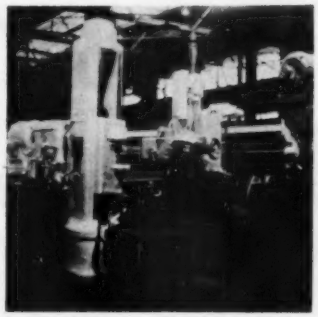
Type: This series of protective coatings have as their base the latest in synthetic resins and additives.

APPLICATION

Method: All four types may be applied by conventional spray or brush techniques.

Preparation of Surface: Surface must be free of all scale, rust, dirt, oil, grease or other deposits. For maximum performance surface should be cleaned down to bare metal. Sand blasting, grit blasting or flame cleaning methods are especially recommended. Where proprietary phosphoric acid rust removers are used, care must be taken to thoroughly rinse all traces of the rust remover from the surface, especially from the crevices. The surface should then be dried thoroughly before application of the protective coating. Where the above methods are not available, wire brushing can be used. It must be done thoroughly, however, to remove all rust deposits down to bare metal.

After cleaning by any of these methods, the surface should be wiped clean and free of dust. Oil and grease may be removed by solvent soaked rags or



waste. Rags should be changed frequently to avoid constant re-oiling of the surface. Soddard solvent of Hi-Flash coal tar naphtha is satisfactory for this purpose. DO NOT USE GASOLINE OR KEROSENE! Where the surface has been previously painted and the coating is still firmly attached to the metal it is necessary only to wire brush the rusted areas or those where paint has loosened. (Note: Although the aluminum coating can be applied directly to the bare metal, a more highly effective coating combination is obtained when it is used over the 5-C Primer.)

Coverage: Primer, 500 to 600 sq ft per gallon; other three, 600 sq ft per gal.

Thickness: Primer, 0.0007 to 0.0008 in. dry film thickness; other three, 0.001 in. dry film thickness.

PROTECTION

Resistance: Designed for general structural protection under outdoor exposure. The resins, on which the coatings are based, have been selected for their resistance to conventional outdoor weathering conditions, and find general use where the grease or oil type NO-OX-ID cannot be employed.

Lubricating Qualities: None. These coatings should not be used where protective coatings with lubricating qualities are desired.

Fire Hazards: 5-C Primer contains solvent with a flash point of 80 F minimum and must be kept away from fires. Other three have flash points of 100 F minimum. Usual precautions must be taken with all of them for solvent fumes in confined areas. Adequate ventilation must be provided.

Manufacturer: Dearborn Chemical Co., 310 S. Michigan Ave., Chicago 4, Ill.

For Building Surfaces

Name: Longlife protective and preservative coating.

Type: A plastic, odorless and non-inflammable product free of solvents, chemical, sludge, fillers or fibers.

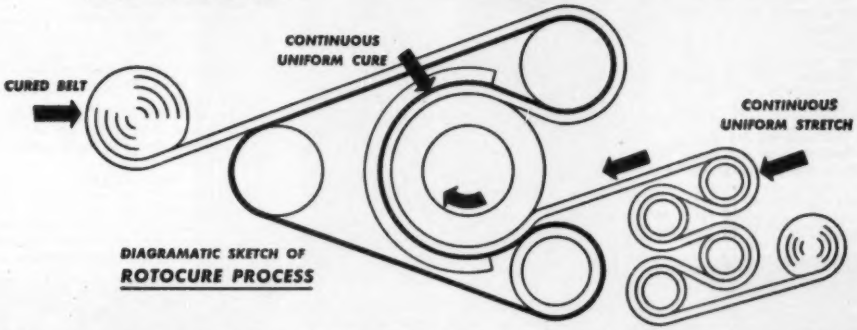
APPLICATION

Method: Longlife may be used "as is" for troweling or gunning—no thinning required. If pouring, brushing or spraying is desirable, water (up to 20 per cent) may be added. When apply-

ROTOCURE Eliminates this "Achilles Heel"*

* Overcured Sections which occur every 30" to 40" are a primary cause of failure in belts made by the flat press method. You won't find these "Achilles Heels" of double vulcanization in BWH Conveyor Belts.

WITH BWH Conveyor Belts



DIAGRAMATIC SKETCH OF
ROTOCURE PROCESS

Curing a small segment of rubber belting *twice* is unavoidable when belts are made under the conventional flat press method. With this "stop and go" technique, a cured segment is advanced slightly less than a press length. As vulcanization is resumed, an overcured segment results due to overlapping. This twice-cured segment is a critical section or "Achilles Heel" of about 2 to 4 inches in length and the width of the belt. It is responsible for structural weaknesses and excessive surface wear which cause early belt failure and high maintenance costs.

To solve this problem, BWH technologists pioneered the ROTOCURE process of *continuous* vulcanization whereby every *inch* of belting receives the same, *uniform* curing treatment. Here are 4 important reasons why ROTOCURE has paid off for users throughout industry, in installation after installation—by longer service life before replacement.

1. Because there is no double vulcanization, uniform abrasion-resistant covers are always assured.
2. A continuous vulcanization eliminates the overlaps which can reduce flex life up to 40%.
3. Mechanical distortion (inherent with flat press curing at the press ends) is eliminated.
4. Constant uniform stretch results at all times.

As with conveyor belting — so with transmission belting, the BWH ROTOCURE process provides all these advantages plus a higher coefficient of friction because dusting agents are not required in the manufacture with ROTOCURE.

Call in the BWH distributor or write us direct for the full story of ROTOCURE and what it can do for you in keeping conveyor belts working efficiently longer — and holding belting costs down to earth.

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BWH
DEPENDABLE RUGGEDNESS

ing to roofs, it may be sprayed or painted to both sides of the corrugated or sheet metal before installation. Then, the exposed surface is given another coat after the sheets are placed. On old roofs the surface may simply be cleaned and two coats of Longlife applied.

With Fabric: Flexrock saturated cotton fabric may be used in conjunction with Longlife to permit bending and flexing of the coating.

On Structural Steel, etc.: May be used on metal ducts, structural steel, metal stacks and other metal building parts by brushing or spraying.

Coverage: Approximately 100 sq ft per gal per coat; two coats are recommended.

PROTECTION

Resistance: Protective against fumes and all forms of moisture. Plastic enough to come and go with expansion, contraction and structural movement.

Manufacturer: Flexrock Company, Filbert and Cuthbert, Philadelphia 4, Pa.

For Insulation Protection

Name: Thermalkote, a protective coating for thermal insulation.

Type: Heavily fibrated asphalt emulsion.

APPLICATION

Method: Applied by trowel without heating. The finished surface may be troweled as smoothly as desired, resulting in a dull, blackish finish. When finished with aluminum paint both heat and light reflection are provided. When used on insulation which is held in place with a wire mesh, or with block insulation finished with insulation cement, entire surface should first be primed. Product recommended for priming is Hydralt Emulsion C-13-HPC applied at the rate of 1½ gal per 100 sq ft. For best results, apply the Thermalkote while the priming coat is still tacky.

Coverage: Applied as it comes from the container it will cover from 45 to 50 sq ft per 100 lb in ¼ in. wet thick-

ness. This will provide a dry, firm film of approximately ⅛ in. thickness, the minimum which should be used. For easy estimating, apply 2 lb per sq ft per coat, the number of coats to be determined by the exposure to be encountered.

PROTECTION

Resistance: Designed to protect thermal insulation, and its insulation properties, from destruction by weathering or moisture. Also resistant to corroding fumes and vibration.

Drying Time: Asphalt emulsion coatings depend on temperature, humidity and thickness of coating to determine length of drying time. Thermalkote should not be applied when it is raining; it should be protected from any watersplash until it is dry. If it is to be painted, a lapse of two to three weeks should be permitted before paint is applied.

Manufacturer: The Flintkote Company, Industrial Products Div., 30 Rockefeller Plaza, New York 20, N. Y.

For Roofs and Sidings

Name: Hydralt Protective Coating, Type C-13-C4.

Type: Fibrated industrial asphalt emulsion of the mineral colloid type, especially recommended for coating weathered asphalt roofing, corrugated or galvanized steel roofs and sidings.

APPLICATION

Method: After it has been stirred thoroughly in the container, Type C-13-C4 may be applied by brush or suitable spray equipment. The coating should be applied without thinning if

possible, but if necessary for improving working or spraying consistency a small amount of water (up to 10 per cent) may be added.

Preparation of Asphalt Roof Surfaces: Roof surface should be cleaned of all dust, dirt, loose or scaling coatings, and foreign matter. Roof should then be washed down with water. All defective spots should be repaired with Type C-13-C4, embedding in the wet emulsion coating a strip of asphalt saturated membrane, extending approximately 6 in. beyond the defective area. Brush the membrane until the coating shows through.

Loose or rusted nails in roll roofing should be driven in and defective seams stripped with membrane 6 in. in width, applied as directed above. Roof surfaces which are badly checked or alligatored, but still firm, should be given a thin priming coat of C-13-C4 diluted 10 to 20 per cent with cool, clean water and scrubbed in well. If roofing felt is found to be powdery and dry, re-liven with Asphalt Primer at the rate of 1 gal per 100 sq ft; allow to dry for at least 24 hr before applying emulsion coating.

Preparation of Metal: Clean surfaces of rust, scale, loose paint by scraping or wire brushing. Rusty metal may be spot primed, after cleaning, by application of red lead.

Coverage: Best results are obtained by the use of 2 or 3 gal per 100 sq ft of roof surface.

PROTECTION

Resistance: Will not sag or flow under heat nor will it check or alligator under long exposure to rain, sun, snow or ice.

Drying Time: Drying time depends on temperature, humidity and thickness of coating being applied.

Manufacturer: The Flintkote Company, Industrial Products Div., 30 Rockefeller Plaza, New York 20, N. Y.

For Tough Weather Conditions

Name: Hydralt Protective Coating, Type C-13-HPC.

Type: A basic, general purpose, mineral colloid emulsion (clay type) made from steam refined asphalts, selected for their resistance to weathering.

APPLICATION

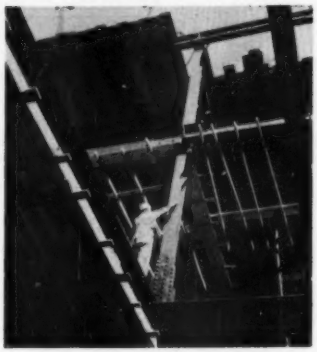
Method: After stirring thoroughly in the container apply by brush or suitable spraying equipment. The number of coats will depend upon thickness of film required for exposure to be encountered. Coating should be applied without thinning if possible but when it is necessary to obtain proper working consistency it may be diluted with 5 per cent cool, clean water.

Preparation of Surface: All metal to be coated should be cleaned of mill scale, rust, dirt, oil and grease down to the bare surface. Wire brushing, sandblasting or other accepted methods may be employed.

Coverage: Adequate protection for most surfaces is obtained by the use of not less than two or three gallons of emulsion per 100 sq ft.

PROTECTION

Resistance: This emulsion is especially recommended for coating metal, including roofs; for weather resistance; as a primer on insulation materials which are to receive waterproofing mas-



tics; and as a bonding coat when cold-laid asphalt mastic flooring is applied over wood, steel, concrete or other firm bases. The coating is also effective for rust and dampness resistance on interior steel and concrete. It may be used in refrigerated spaces without fear of odor contamination.

(Continued on page 70)

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BullDog Unit-Versal® Vacu-Break Switchboards

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Simple to wire. Only a screwdriver and crescent wrench are needed to assemble, install, extend or convert these modern switchboards. Removable front plates provide quick access to large wiring gutters at top, bottom and both sides.

Large mounting space. More than 5½ feet of vertical mounting for branch circuits. Blank filler plates cover unused space and allow for future unit additions. All sections and units can be interchanged quickly and easily.

Complete Distribution Sections. Distribution Sections accommodate the full range of interchangeable ET Circuit Breakers and fusible Vacu-Break switch units—15-ampere to 600-ampere capacities.

Complete Service Sections. Service Sections include space only for meter and current transformer. They also include riser bus and Main ET Circuit Breaker or Fusible Vacu-Break Switch in capacities of 225, 400, or 600 amperes or Main Air Circuit Breaker of 800-, 1200-, or 1600-ampere capacities.

Extremely flexible. New Unit-Versal Service and Distribution sections may be used individually or combined into multiple-section switchboards. Sections may be added or removed as needed.

Vacu-Break Switch Units or ET Circuit Breakers (as indicated) may be used as Mains in Service Sections. Vacu-Break Switch Units are Horsepower-rated and approved by Underwriters' Laboratories.

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Drying Time: Asphalt emulsion coatings have a drying time which depends on temperature, humidity and thickness of coating being applied. When feasible, 24 to 48 hr should be allowed. Drying will take longer in enclosed areas. Fans may be used to speed drying.

Manufacturer: The Flintkote Company, Industrial Products Div., 30 Rockefeller Plaza, New York 20, N. Y.

For Roof Protection

Name: Cocoon-Mastic roof application.

Type: Vinylite plastic, black mastic and Gilsonite aluminum.

APPLICATION

Method: Applied with standard pressure spray equipment.

Equipment: Binks Model 19 spray gun with a No. 63 PB air cap, De Vilbiss MBC spray gun with No. 76 air cap are used for the Cocoon. Requires a minimum of 23 cu ft of air at an atomizing pressure of 70 lb. Mastic is sprayed by means of an Alemite Versatal Heavy Duty Pump and Alemite Long Pole Gun. Gilsonite Aluminum Topcoat is sprayed with a Binks No. 66SD air cap and a De Vilbiss No. 30 air cap. Fluid pressure is approximately 15 lb and atomizing pressure 30 to 40 lb.

Surface Preparation: Entire area is swept clean and debris is removed; any traces of oil or grease are removed;

loose boards are nailed securely; ripples in felt are cut and nailed; bubbles are cut and air or water removed; roofing membrane is placed over open joints or large breaks; lifted or disintegrated felt are removed.

Treatment of Corners: Sealing compound is first sprayed in all inside corners and these areas sprayed with a semi-wet application of Cocoon. The cant strip, a triangular piece of wood, is next nailed in all corners to secure the film permanently and prevent bridging. The Cocoon sprayed in these corners should extend approximately 4 to 6 in. beyond the edge of the cant strip to permit bonding when entire roof is sprayed.

Thickness: Cocoon—0.010 in.; Black Mastic—1/16 in.; Aluminum topcoat—0.010 in.

PROTECTION

Mold Groups: Cocoon must resist action of all major mold groups.

Mildew: Cocoon must resist action of all major mildew groups.

Weathering: Combination of Cocoon-Mastic roofing showed no loss of tensile strength, no loss of elongation, no checking, cracking or formation of bubbles after 1500 hr of accelerated weathering (6½ years).

Manufacturer: Cocoon Engineering Div., R. M. Hollingshead Corp., 840 Cooper St., Camden 2, N. J.

To Insulate and Protect

Name: Insul-Mastic Type "D" Insulation and Protective Coating.

Type: Black mastic having a Gilsonite base and containing a large percentage of high quality mica flake. The coating is impregnated with granulated cork for insulation as well as corrosion prevention.

APPLICATION

Method: Applied by spraying. Can be troweled, but spraying is the generally accepted, faster and preferred method.

Equipment: A heavy duty spray gun having a ¼ in. nozzle. An air compressor having a 60 cu ft to 105 cu ft capacity. Material and air hoses. For steady, fast pumping of the material to the spray gun, manufacturer makes a special spraying machine having a material hopper and a high speed air motor.

Surface Preparation: Metal must be dry and free from rust, scale, grease, chemicals and dust. Before application it is best to sandblast, flame clean or wire brush. When it is impossible to apply immediately after cleaning, a zinc chromate primer should be used. If prepared surface has been allowed to stand for a while, it should be wiped down before application.

Thickness: Should be applied ¼ in. to ⅜ in. thick.

Membraning: A woven glass fibre membrane is recommended for use over joints and right angles. It is applied by pressing it into a thin tack coat of Insul-Mastic.

Angle of Surface: Insul-Mastic Type "D" will adhere to a properly prepared surface at any angle including ceilings.

Decoration: Insul-Mastic Type "D" is black but, if desired, it may be attractively finished with Insul-Mastic Aluminum Spray; or in a number of colors available in an Insul-Mastic plastic coating; or by blowing colored stone

granules into the protective coating while it is still wet.

Applicators: Insul-Mastic has licensed contractors in principal cities to apply its coatings. These contractors have trained engineers, crews and necessary equipment.

PROTECTION

Acids: Recommended for protection against most acids.

Alkalies: Recommended for protection against most alkalies.

Sun: Unaffected by the actinic rays of the sun.

Temperature: Minus 40 F to plus 300 F. Rapid changes of temperature within this range will not harm the coating.

Water: Will prevent the transmission of water and moisture to the material covered and thus prevent rusting.

Insulation: Insul-Mastic Type "D" is not only a protective coating possessing all the qualities of Gilsonite Insul-Mastic, but it is also an insulation. It contains a very large percentage of granulated cork which gives it an insulation value similar to that of corkboard. It will stop 65 per cent of heat flow through metal plates.

Condensation: Controls condensation or "sweating" on pipes, ducts, vessels, panels, etc. Adhesion and moisture vapor resistance prevent condensation beneath coating.

Moisture Vapor: Moisture vapor transmission rate per 100 sq in. per ⅛ in. thickness per 24 hr is 0.01 grams.

Weathering: In accelerated weather tests in an accepted type of weather machine, Insul-Mastic Type "D" has lasted the equivalent of over 50 years.

Fire: Will not support combustion after drying.

Manufacturer: Insul-Mastic Corporation of America, Oliver Bldg., Pittsburgh 22, Pa.

For All Metal Sufaces

Name: Gilsonite Insul-Mastic Protective Coatings.

Type: Black mastic having a Gilsonite base and containing a large percentage of high quality mica flake.

APPLICATION

Method: Applied by spraying. Can be troweled, but spraying is the generally accepted, faster and preferred method.

Equipment: A heavy duty spray gun having a ¼ in. nozzle. An air compressor having a 60 cu ft to 105 cu ft capacity, material and air hoses. For steady, fast pumping of the material to the spray gun, Insul-Mastic manufactures a special spraying machine having a material hopper and a high speed air motor.

Surface Preparation: Metal must be dry and free from rust, scale, grease, chemicals and dust. Before application it is best to sandblast, flame clean or wire brush. When it is impossible to apply material immediately, a zinc chromate primer should be used. If prepared surface has been allowed to stand for a while it should be wiped down before application.

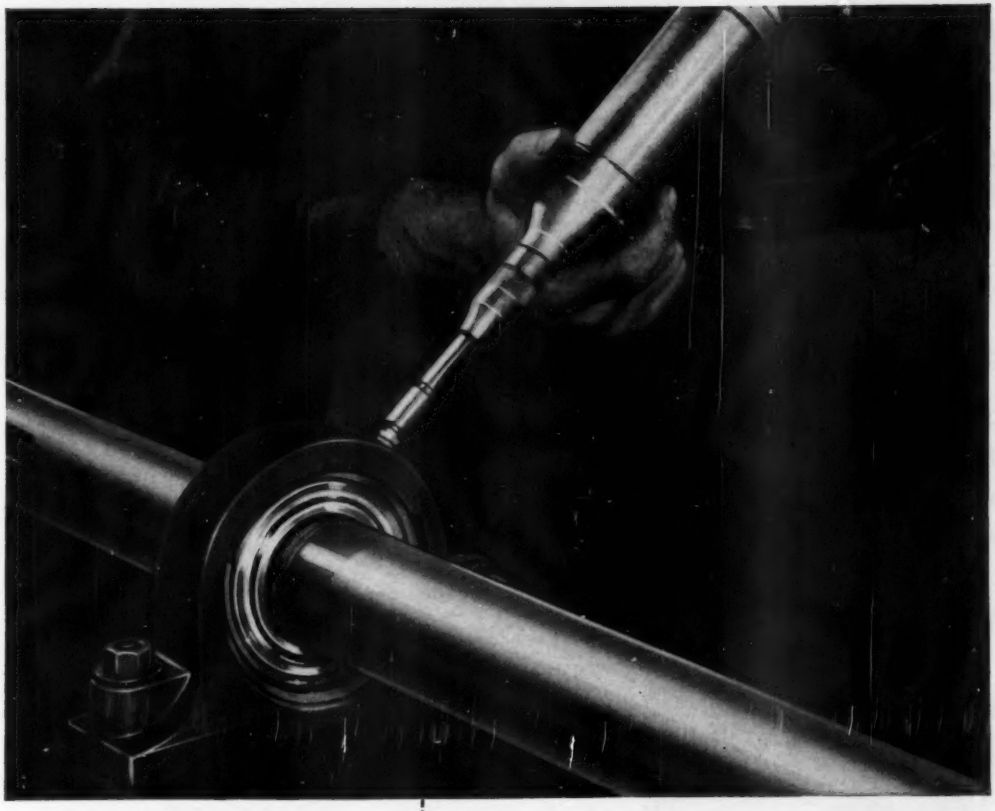
Membraning: A woven glass fibre membrane is recommended for use over joints and right angles. It is applied by pressing it into a thin tack coat of Insul-Mastic.

Thickness: Should be applied 1/16 in. to ⅛ in. thick.

Angle of Surface: Will adhere to a properly prepared surface at any angle including ceilings.

Decoration: Gilsonite Insul-Mastic is black but, if desired, it may be attractively finished with Insul-Mastic Aluminum Spray; or in a number of colors available in an Insul-Mastic plastic coating; or by blowing colored stone granules into the protective coating while it is still wet.

Applicators: Insul-Mastic has licensed contractors in principal cities to apply



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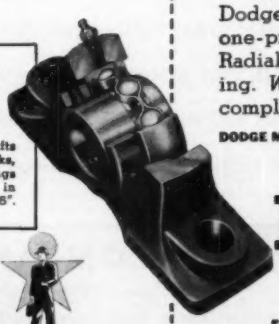
The Seal Won't Blow!

DODGE TYPE "SC" BALL BEARING PILLOW BLOCK

Precision built bearing for small shafts and moderate loads. Pillow blocks, flange bearings and hanger bearings available from distributors' stocks in shaft sizes ranging from 3/4" to 2-7/16".



CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained, he can give you valuable assistance on new, cost saving methods. Look for his name under "Power Transmission Equipment" in your classified telephone book.

METALLIC-BACKED neoprene seals are used in this famous bearing—and they are engineered to *stay put.* They can't blow.

Your lubricant stays in; dust and dirt stay out; the result is years and years of trouble-free performance.

The "SC" Bearing is a new member of the Dodge 30,000 hour line. Modern styling. Rugged one-piece cast iron housing. Long inner race. Radial and thrust load capacity. Fully self aligning. *WRITE* for special "SC" bulletin, giving complete specifications.

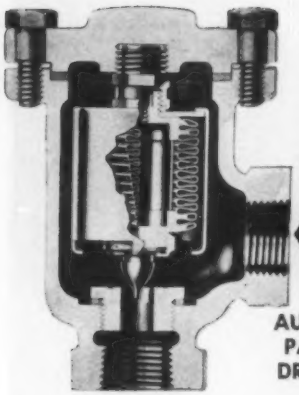
DODGE MANUFACTURING CORPORATION, 2700 Union St., Mishawaka, Ind.

DODGE
of Mishawaka, Ind.

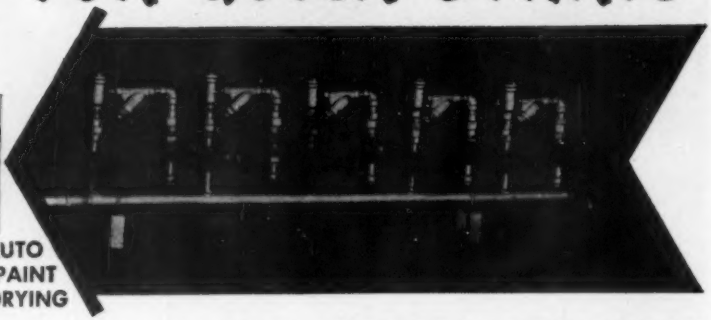
FIRST IN POWER TRANSMISSION MACHINERY

NAME PLATES

FOR YOUR NAME PLATE REQUIREMENTS, WRITE OUR SUBSIDIARY, CHICAGO THRIFT ETCHING CORPORATION, 1555 N. SHEFFIELD AVE., CHICAGO, ILLINOIS



FOR QUICK STARTS

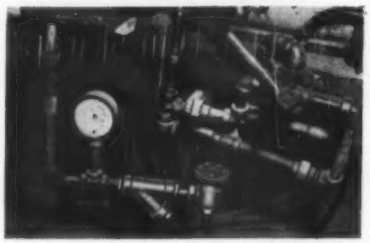


AUTO PAINT DRYING

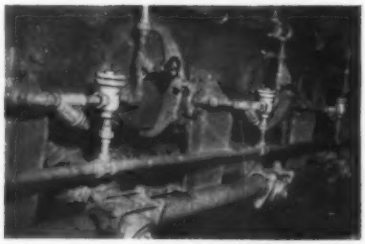
. . . AND STEAM ECONOMY

SARCO No. 9 THERMOSTATIC STEAM TRAP

The hours of waiting in the morning for steam equipment to warm up can be reduced to minutes with the Sarco No. 9 thermostatic steam trap. It is wide open when cold. All air and condensate pass quickly. Then, during normal operation, condensate is discharged at a temperature within 10°F of that of the steam. This has given the trap double its former capacity. No seat changes are required for varying pressures within the range of each type from 0 to 300 p.s.i.



END GLUING



BOTTLE WASHING

PUT ONE ON EACH COIL

This trap is so inexpensive that one can be placed on each coil or jacket and thus save enough in fuel and increased production to pay for the hook-up in a short time. The Sarco No. 9 is used extensively for process tanks, steam lines, radiators and wall coils, tracer lines and outdoor applications of all kinds. Ask for Catalog No. 250-A.

314

SARCO SAVES STEAM

SARCO COMPANY, INC.
Represented in Principal Cities
Empire State Building, New York 1, N. Y.
SARCO CANADA, LTD., TORONTO 5, ONTARIO

IMPROVES PRODUCT QUALITY AND OUTPUT

its coatings. These contractors have trained engineers, crews and necessary equipment.

PROTECTION

Acids: Recommended for protection against most acids.

Alkalies: Recommended for protection against most alkalies.

Sun: Unaffected by the actinic rays of the sun.

Temperature Range: Minus 40 F to plus 300 F. Rapid changes in temperature within this range will not harm the coating.

Water: Will prevent the transmission of water and moisture to the material covered and thus prevent rusting.

Moisture Vapor: Moisture vapor transmission rate per 100 sq in. per ⅛ in. thickness per 24 hours is 0.01 grams.

Weathering: In accelerated weather tests in an accepted type of weather machine, Gilsonite Insul-Mastic has lasted the equivalent of over 50 years.

Fire: Will not support combustion after drying.

Manufacturer: Insul-Mastic Corporation of America, Oliver Bldg., Pittsburgh 22, Pa.

For Acids, Salts, Alkalies

Name: Insul-Mastic Plastic Protective Coating.

Type: Vinyl plastic cut back by a solvent which when dry leaves a nonporous, durable plastic surface.

APPLICATION

Method: Applied by spraying or brushing.

Equipment: Standard paint spraying equipment or brush.

Surface Preparation: Surface must be clean and dry and free from rust, scale, dust, grease, loose paint, etc. Metal should be sandblasted or flame cleaned followed by a wash primer. Where application is made over an old paint, a test patch in a hidden place will determine if the plastic solvents will affect the bond of the paint.

Angle of Surface: Insul-Mastic Plastic will adhere to a properly prepared surface at any angle including ceilings.

Number of Coats: Two to four or more depending upon degree of protection needed and severity of conditions. Special types of plastic are used for the different coats.

Membraning: This plastic coating has a greater tensile strength and does not normally require membraning. However, if additional strengthening is desired on corners or joints, membraning as specified for Gilsonite Insul-Mastic may be used. Press it into a tack coat of Insul-Mastic Plastic.

Applicators: Insul-Mastic has licensed contractors in principal cities to apply its coatings. These contractors have trained engineers, crews and necessary equipment.

Colors: Proven industrial shades of Red, Tile Red, Yellow, Buff, Dark Green, Light Green, Light Blue, Cream, Light Grey, Dark Grey, Black, White and Aluminum. Special colors can be matched.

PROTECTION

Acids: Highly resistant to spillage and fumes of nearly all acids except acetic, formic and hydrofluoric.

Alkalies: Highly resistant to spillage and fumes of nearly all alkalies.

Salts: Highly resistant to salts.

Oils: Impervious to oils which normally dissolve protective coatings.

Alcohol: Impervious to alcohols except for the plastic coating designed for application over Gilsonite Insul-Mastic.

Water: May be used to line water tanks or for constant immersion in water. Being a plastic, the coating is as impervious to moisture as any other plastic.

Sanitation: Approved by boards of health for use in direct contact with foods.

Weathering: A life many years beyond that of paint may be obtained in the severest outside weather.

Temperature: Up to 150 F.

Cleaning: Non-porous, does not absorb dirt, can be washed clean like glass. None of the coating is removed by the cleaning.

Manufacturer: Insul-Mastic Corporation of America, Oliver Bldg., Pittsburgh 22, Pa.

For Water Tanks, A. C. Equipment

Name: Koppers Bitumastic Tank Solution.

Type: A quick-drying material especially designed for use on water tanks, air conditioning equipment and similar pieces of equipment.

APPLICATION

Method: By brush, spray or dip. Minimum requirements for spraying: vacuum spray, air pressure 12 psi; pressure pot, atomization air pressure, 50 psi, fluid pressure, 20 psi. Air hose should be lined with solvent resistant Neoprene.

Preparation of Surfaces: The same as for any type of paint. Loose materials, foreign materials such as oil, grease, scale, etc., must be removed by approved methods.

Preparation of Product: When thinning is necessary use only Bitumastic Tank Solution Thinner, not Bitumastic Thinner. Thinning is not recommended except for spraying in cold weather, then use no more than ½ pt per gallon.

Coverage: 350 to 450 sq ft per gallon on smooth surfaces, less on rough or porous surfaces.

Drying Time: Dust-free, 2 to 4 hr between coats; 12 hr under normal conditions of temperature and humidity. Where used to protect tanks or equipment holding potable water, the coating must be thoroughly dry and the coated surfaces flushed well with water before the units are put in service.

Number of Coats: Two to assure thorough coverage. Additional coats where conditions are more difficult.

PROTECTION

Resistance: Designed primarily to be highly resistant to the penetration of water and to solution in water.

Manufacturer: Koppers Company, Inc., Tar Products Div., Pittsburgh 19, Pa.

For Severe Corrosion

Name: Koppers Bitumastic No. 50, for severe corrosive conditions.

Type: Specially formulated and processed to permit easy application of thick protective films without sagging, even on vertical surfaces.

APPLICATION

Method: Either by spraying or brushing. For spraying, use the Alemite Versatal Pump or equivalent heavy-duty pump having an air-nozzle pressure conversion ratio of at least 5 to 1. Use a brush as you would a trowel when applying No. 50 due to its thickness.

Preparation of Surface: All surface contaminants must be removed. Grit or sand blasting, flame cleaning, power or hand wire brushing or any other approved method of cleaning may be employed.

Preparation of Product: No thinners may be used in No. 50. When container is opened the material will appear to be too heavy to apply. It is thinned to the proper consistency (heavy molasses) solely by stirring.

Coverage: 55 to 70 sq ft per gallon.

Number of Coats: Two to three depending on the corrosive conditions to be combatted.

PROTECTION

Resistance: Impervious to moisture, and protective against practically all acid or chemical fumes, steam and heat.

Manufacturer: Koppers Company, Inc., Tar Products Div., Pittsburgh 19, Pa.

For Corrosive Fumes, Weather

Name: Koppers Bituplastic No. 28.

Type: An extremely heavy bodied, flame resisting coating containing no volatile solvents.

APPLICATION

Method: Brush or spray. Using heavy duty pump for spray application, air pressure should be 50 to 90 psi; air pressure at pump for fluid, 35 to 90 psi. Air adjusted at gun for proper atomization.

Preparation of Surface: Surfaces should be cleaned by approved methods. Surface should be primed with Bituplastic Primer when No. 28 is to be applied to bare metal.

Coverage: 50 to 60 sq ft per gallon.

Drying Time: One to 2 hr under normal conditions of temperature and humidity. Drying rate is somewhat the same as the evaporation rate of water under similar conditions.

Number of Coats: Two or more to obtain thorough coverage.

PROTECTION

Resistance: High resistance to weather and climate and to corrosive fumes from industrial operations.

Manufacturer: Koppers Company, Inc., Tar Products Div., Pittsburgh 19, Pa.

For High Temperatures

Name: Koppers Bitumastic Hi-Heat Gray.

Type: A coating for corrosion prevention at high temperatures.

APPLICATION

Method: Applied best by hand brushing, to a uniform coating.

Preparation of Hi-Heat: Hi-Heat Gray comes packaged in 1 gal and 5 gal kits, each kit consisting of two containers. In one is the oil vehicle, the other contains a metallic zinc powder. The oil vehicle should first be stirred to obtain even dispersion of the pigments; next, add a small amount of the vehicle to the zinc powder and stir the mixture to a uniformly thick paste in which the zinc powder particles are uniformly dispersed throughout the vehicle. When all powder has been thoroughly "wetted" add about half the vehicle to the paste. Stir thoroughly, add the rest of the vehicle, and again stir thoroughly.

Coverage: 450 sq ft to the gallon.

Drying Time: Drying time is 18 to 24 hr. For best results, the coating should be allowed to dry at least 24 hr before being subjected to high temperatures and the operating temperature should be raised gradually.

Number of Coats: Only one coat should be applied. Holidays or pin holes should be left until they show up as rust spots. These places can then be wire brushed and coated with Hi-Heat Gray.

PROTECTION

Resistance: Resistant to the corrosive attacks of industrial fumes at high temperatures. Temperature limits are 1200 F intermittent, and 800 F continuous dry heat.

Manufacturer: Koppers Company, Inc., Tar Products Div., Pittsburgh 19, Pa.

For Pipes, Tanks, Surfaces

Name: Mortell's No-Drip.

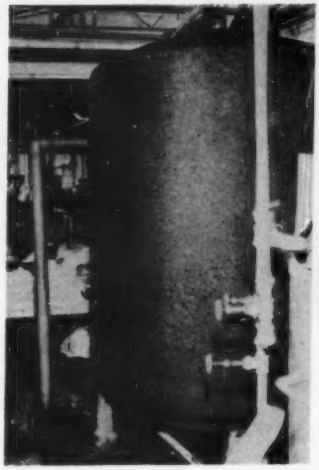
Type: Described as a triple-duty, insulation-type coating in flexible form.

APPLICATION

Method: May be applied by brushing, troweling, spraying or by hand when only small surfaces are to be protected. When applying by spray material pressure should be 70 to 100 psi; air supply at least 25 cfm at 100 psi; working pressure of material hose 125 psi.

Surface Preparation: Readily adheres to any clean, dry surface, including galvanized areas. It is necessary to remove all oil, grease, dust, scale. rust and moisture. Normally the use of a wire brush is sufficient, but in cases of severe rust the scale should be removed by scraping or by sandblasting. For areas that can not be thoroughly cleaned, a coat of No-Drip Primer is necessary to insure a good bond. On flanges, joints, bolts, etc., apply a foundation coat to all hollows, edges and corners. It is easier to work No-Drip into places such as these by using the hands. Allow it to dry thoroughly before applying to entire area.

Coverage: A gallon will, generally, give a wet coating ¼ in. thick covering 6 sq ft of rounded, flat or irregular surface. Conditions which are to be overcome by the No-Drip govern the thickness recommended, however. This may vary the thickness from ⅛ to ½ in.



Number of Coats: Two coats. Applied about ⅛ in. at a time will give 90 to 100 per cent protection.

PROTECTION

Resistance: Acting as a moisture-proof insulation No-Drip prevents oxidation by keeping moisture away from the metallic surfaces. Further, it acts as a thermal insulation to prevent condensation of moisture on cold water lines, tanks and other surfaces. Treated surfaces are not affected by acids, alkalies, salt solutions and vapors.

Manufacturer: J. W. Mortell Company, 537 Birch St., Kankakee, Ill.

For Old or Moist Metal Surfaces

Name: Prufcoat Metal Reactive Primer P-10, and A-Series Prufcoat. The latter is available in a choice of colors.

Types: Primer P-10 contains a chromate pigment as well as a phosphoric acid solution which reacts with the iron or steel surface to produce a rust-inhibited metal. A-Series Prufcoat is a liquid plastic formulation which air-dries to form a tough, corrosion-resistant plastic coating.

APPLICATION

Method: Application of either type may be by brush or spray.

Drying Time: For Primer P-10: 30 to 45 minutes at ordinary room temperatures and humidities. If temperature is below 60 F and relative humidity is high, an hour or more drying time should be allowed. For A-Series Prufcoat: drying time between coats, under ordinary conditions, is 4 hr.

Preparation of Surface: Primer P-10 is a moisture and corrosion resistant material which may be applied to damp or dry metal surfaces that are reasonably rust-free and have been degreased. A-Series Prufcoat is applied to surfaces previously treated with Primer P-10.

Coverage: Approximately 500 sq ft per gal.

PROTECTION

Resistance: Primer P-10 reacts with the metal to dry up excessive moisture, inhibit further rusting. A-Series Prufcoat, when applied in the recommended number of coats for the exposure conditions to be encountered (three coats for protection against chemical fumes and occasional drips of corrosive chemicals) provides a long-lasting coating that is proof against the corrosive action of acids, alkalies, alcohol, oil, salt and water.

This system of corrosion proofing is recommended for all ferrous and aluminum surfaces but is not recommend for phosphate-treated, Bonderized or Alox-treated steel, or for stainless steel clad materials.

Manufacturer: Prufcoat Laboratories, Inc., 63 Main St., Cambridge 42, Mass.

For Metal Surfaces

Name: Pittsburgh Ironhide Protective Coating.

Type: A relatively fast drying, rust inhibitive coating.

APPLICATION

Method: May be brushed or sprayed on surface to be covered.

Preparation of Surface: Grease or oil should be removed with naphtha; dirt and loose paint film should be dusted, wire brushed or scraped off to leave a clean smooth surface. Rust should be removed by any approved method.

Number of Coats: May be used as a primer under Sun-Proof paint for exterior work or left unpainted in one or more coats for interior work.

PROTECTION

Resistance: Resists rust and corrosion, adheres to metal surfaces during extremes of heat and cold or rain and snow. It withstands engine fumes, industrial gases, oil and soot.

Manufacturer: Pittsburgh Plate Glass Co., 632 Duquesne Way, Pittsburgh 22, Pa.

For Tanks, Piping, Roofs

Name: Rust-Oleum Rust Preventive Coatings.

Type: Scientifically formulated, odorless fish oil vehicle with added pigmentation. Both long oil and short oil types.

APPLICATIONS

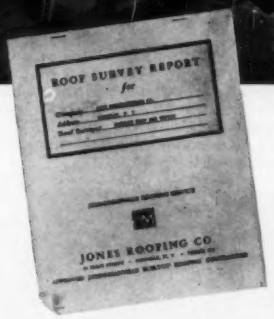
Method: Apply with a brush.

Surface Preparation: Remove all rust scale, old paint scale, blisters, loose rust, dirt, grease, oil or other foreign substances with a wire brush and scraper. Complete removal of all rust is not necessary. If scale and rust are hard to remove apply a liberal coating of the manufacturer's No. 785 Thinning Oil and allow sufficient time for oil to penetrate scale.

Newly galvanized surfaces should be washed with naphtha to remove grease and oil. Immediately treat the surface with liberal applications of vinegar or acetic acid or with copper sulphate solution (made by dissolving 1 lb copper sulphate crystals per gallon of water). Allow this application to dry for 1 hr. The surface should turn black. When dry, rinse off with clear water and allow surface to dry thoroughly be-

(Continued on page 76)

THESE MEN are making a "Roof Survey Report." Ask about this free service . . .



The Built-Up Roof Survey tells exactly what condition your roof is in, gives you a permanent record, helps you plan ahead for roofing maintenance. Yours for the asking!

TAKE ADVANTAGE of this *free* Johns-Manville service to find out the exact condition of your built-up roof. It will enable you to make plans *now* for repairs and maintenance in the future.

That's what plant engineers and maintenance executives *like* about the J-M Roof Survey Plan.

Don't take *your* roof for granted, even though it doesn't *seem* to be leaking. Many a roof with torn flashings, dried-out felts, even rotted decks has been *assumed* to be in "good condition." The Roof Survey Report will cover all the critical areas . . . flashings, deck, roofing felts, parapet walls, skylights, etc. It will be an accurate picture by a roofing *expert*—the J-M Approved Built-Up Roofing Contractor. And it will cost you only the trouble of *asking* for it.

Let us send you the interesting booklet, "Things You Should Know About Your Roof." It gives complete information about the *free* J-M Roof Survey Plan, together with the full story of the J-M Flexstone* Asbestos Roof and the Asbestile* Flashing System. Write Johns-Manville, Box 158, New York 16, N. Y.

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Box 158, New York 16, N. Y.

Please have one of your Approved Built-Up Roofing Contractors see us about making a free survey of our roof.

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Johns-Manville FLEXSTONE Built-Up Roofs

ASBESTOS CORRUGATED TRANSITE* • ACOUSTICAL CEILINGS • DECORATIVE FLOORS • MOVABLE WALLS • ETC.

fore applying Rust-Oleum. Follow this method when preparing galvanized portions of partly rusted roofs, or if the surface is weathered but not previously painted.

To seal old asphalt-coated surfaces apply a one-coat mixture of either Rust-Oleum No. 632 Quick Drying Aluminum for interior work or No. 592 Aluminum for exterior surfaces into which one extra pound aluminum paste is added for each gallon of 632 or 592.

PROTECTION

Heat Resistance: When surface temperature does not exceed 500 F it is recommended that equipment receiving coating be placed in service after a waiting period of 6 to 12 hr. Then a gradual increase in temperature is allowed until surface temperature is at

normal heat. After prime coat dries thoroughly, second coat can be applied and gradual heat rise allowed once more.

When normal surface temperatures are from 500 to 1000 F special precautions should be taken to see that all surfaces are clean before application of Rust-Oleum Heat Resisting Coatings. Second coats should be applied to equipment only after complete drying and a short period of normal service for the first coat. Recommended for use on 500 to 1000 F surfaces are 55 H.P. Ready Mixed Aluminum and 959 H.P. Aluminum.

Chemical Resistant Coatings: These are recommended for use on interior or exterior surfaces subjected to severe acid or alkali fumes, condensates, moisture vapors, alcohol fumes, oils and greases or wherever ordinary coatings have not served well. These coatings are fortified with rubber.

Weathering: Will withstand general weathering, dampness, high humidity or condensation.

Manufacturer: Rust-Oleum, Evanston, Ill.

For Equipment, Structures

Name: Texaco Rustproof Compounds. Compound L, the lighter grade; Compound LB, same as L but black in color; Compound H, heavy grade.

Type: A relatively viscous, nonhardening material that is smooth and readily workable.

APPLICATION

Method: It can be applied as it comes comes from the container by brush. It can be thinned down by the addition of kerosene or unleaded white gasoline and then sprayed on. Compound H is applied with brush or trowel.

Preparation of Surface: May be applied to surfaces already rusted because it penetrates the existing rust to the metal itself and prevents further corrosion. In addition, if rust is heavy and scaly, it will loosen the encrustation and make it easy to remove. Applied on clean metal it provides a soft, self-sealing, non-hardening, waterproof film.

Coverage: No definite coverage of the product can be guaranteed, since application conditions will vary. It has been found that 8 to 10 lb (1 to 1¼ gal) will usually be required per ton of structural bridge steel. Coverage on flat surfaces will vary from 200 to 600 sq ft per gal, depending on the surface.

Removal: May easily be removed with rag saturated with kerosene.

PROTECTION

Resistance: Depends on service. On bulldozers or other equipment in service where the compound may be removed with a day's work, the parts should be sprayed after each day's work. Highway or railroad bridges often need no additional coverage for three years; this is particularly true if bad spots are retouched during the first year. Resistant to all weathering in marine service, oil fields, railroads or industrial plant service.

Manufacturer: The Texas Co., 135 E. 42nd St., New York 17, N. Y.

For Metal Surfaces

Name: Ensis Compound 302.

Type: A solid which melts at approximately 146 F.

APPLICATION

Method: By brush, after heating. By hot dipping when protecting parts.

Preparation of Surface: Manufacturer points out that choice of method of cleaning will depend to a great deal upon makeup of equipment to be protected. Non-metallic parts of machinery, such as rubber and fabric, need special consideration. Assemblies which have fine capillary tubes, porous parts, or other special design characteristics also need special attention. Contamination of surface by any foreign substance must be corrected. In case of grease or oil it may be removed by use of solvents; rust or scale by blasting.

Coverage: Approximately 550 sq ft per gallon.

PROTECTION

Resistance: In a rusting test materials coated with this compound withstood over 1000 hr in a humidity cabinet; withstood unsheltered outdoors exposure for a period of 12 to 24 months; withstood indoor exposure and sheltered outdoor exposure for over 24 months.

Manufacturer: Shell Oil Company, Inc., Lubricants Dept., New York City.

Attachments Do The Trick to Speed Induction Hardening

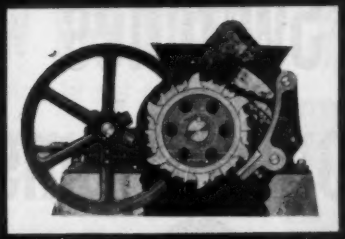
Contributed by The Maytag Co.

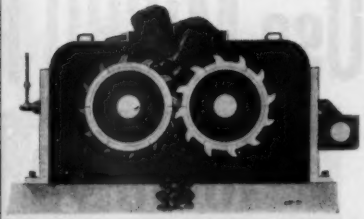
AN INDUCTION hardener, fitted with two attachments, is doing a remarkable job of saving our company time and money.

The attachments consist of a chute-like arrangement which feeds the spline into the induction hardener to be heat treated, and a second one, a small conveyor which catches the parts as they come off the line and sorts them in a rack where the operator can fill the boxes in neat order.

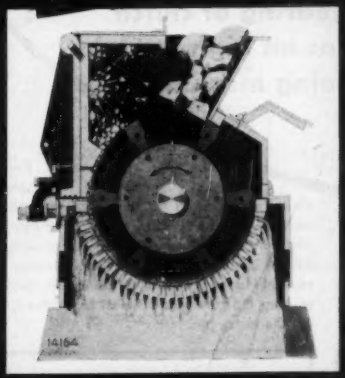
Although the attachments which are being used are models made of carpenter shop pieces, the method will be improved upon later with industrial equipment. The estimated cost of equipment for installing this idea was $425.

These attachments to induction hardener help it to do a man-size job. Attachments shown feed and take away the finished splines after heat treatment

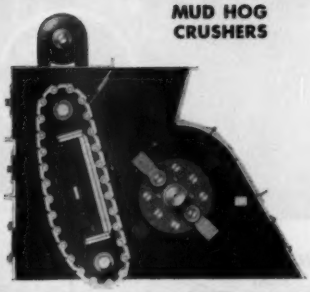




CRUSHERS
PULVERIZERS
SHREDDERS



MUD HOG CRUSHERS



CAPACITIES— *1* TO *1200* TONS PER HOUR

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ESTABLISHED 1877

Complete Line of Material Handling, Processing and Mining Equipment

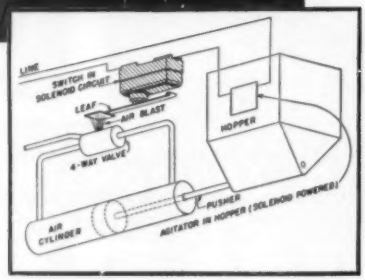
Use MICRO Precision Switches to Solve Production Problems!

This switch prevents shearing of clutch pins on high-speed dieing machine

Installed under the clutch foot pedal of this high-speed dieing machine, this MICRO precision switch automatically causes the drive to return to slow speed when the clutch lever stops the ram motion. Connected in parallel with the "slow" button of the variable speed control it eliminates chance of starting the ram with drive at high speed, shearing the clutch pin.

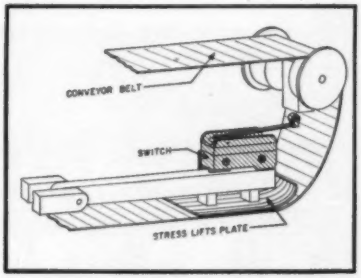
SEND FOR "MICRO TIPS"

Send for "MICRO TIPS" for more practical, time-saving ideas discovered by plant production men who have found MICRO precision switches the way to production short cuts. MICRO SWITCH distributors with complete stocks are located in over 100 cities to serve you. Look in your classified phone book.



Air blast operates switch to feed drill blanks from hopper

A short blast of exhaust air from the four-way valve strikes hinged metal vane to operate the MICRO precision switch. Switch operates solenoid on hopper which provides the necessary mechanical agitation to feed the drill blanks. Solenoid has spring-gravity return.



Find MICRO precision switch great trouble saver on conveyor belt

If this conveyor belt becomes stuck or overloaded, the increased stress lifts switch to contact and the conveyor is stopped automatically.

MICRO... first name in precision switches

MICRO Precision Switches

MICRO SWITCH
FREEPORT, ILLINOIS, U.S.A.

A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

Copr. 1951 Minneapolis-Honeywell Regulator Co.

NEW PRODUCTS

summarized for your convenience

MAGNETIC CLUTCH

Reversing or two-speed; for machine tool drives, process controls

In this newly designed Magneclutch there are two driving members and one driven member; the driving members rotate in opposite directions, and a simple reversing drive is controlled by energizing the proper excitation coil.

It is noted that because of the single low inertia driven member there is no backlash in the output shaft, and gearing arrangement used need not be limited to any particular ratio. The gearbox may be eliminated and each driving member connected to a separate power source. A further extension of this design is a two-speed transmission, described as advantageous for remote control, since excitation power is low and three small wires can carry current over long distances. Vickers Electric Div., Vickers, Inc., 1815 Locust St., St. Louis 3, Mo.

FLARE NUT WRENCHES

For use on fuel, hydraulic and gas lines; have hex openings

The No. CS-3236 for 1 to 1-⅛ in. lines and the CS-2438, ¾ to ⅞ in., are recent additions to company's line of flare nut wrenches. They're drop-forged from alloy steel, heat treated, chrome plated and have hex openings to provide a better bite and prevent turning the comers on soft brass nuts usually found on copper lines. Owatonna Tool Co., 446 N. Cedar St., Owatonna, Minn.

PIPE BRACKETS

And mast arms, for mounting street lighting fixtures

Available in both aluminum and galvanized steel, these brackets and mast arms are designed to exceed NEMA-EEI specifications. Bracket and pole plate are built in one assembly to eliminate assembling them on the job. Installation is by a keyhole slot in the pole plate which enables lineman to hang the assembly on a bolt driven through the pole while tightening other bolts.

The aluminum units are light in weight for one-man installation. A large radius of bend is allowed for bringing cable through the bracket to facilitate wiring and guard the insulation. Lighting and Rectifier Divs., General Electric Co., Schenectady 5, N. Y.

CATALYTIC EXHAUST

For handling obnoxious gases from gasoline-powered lift trucks

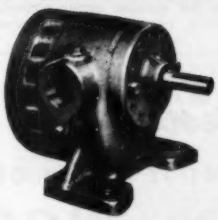
The OCM Catalytic Exhaust is designed to render exhaust gases non-poisonous and odorless by means of a built-in catalyst. This exhaust has a steel housing and is installed in place of a standard muffler. It requires about the same amount of space, company says, and imposes no more back pressure on the engine. It weighs 20 to 30 lb.

A pyrometer, installed on the instrument panel, indicates "safe range" when exhaust is operating satisfactorily. This

LIFT LOWER PUSH PULL

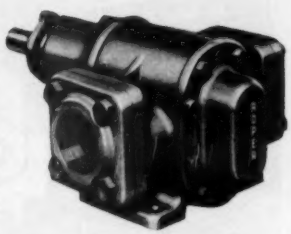
...for Dependable Hydraulic Service, install ROPER Rotary PUMPS

PRESSURES TO 1000 P.S.I.



Roper *dependable* Pumps! Smooth running units that add to the efficiency of diversified hydraulic applications. The Roper principle of only two moving parts—equal size pumping gears operating in a sturdy case with proper clearance—results in superior serviceability and promotes long life. The Roper Pumps illustrated are representative of standard pumps suitable for most installations. For unusual applications, let Roper engineers work with your design engineers in developing a special Roper to fit your needs.

SERIES H . . . Pressures to 1000 P.S.I.—Capacities 10 to 75 G.P.M. Spur gears operate in axial hydraulic balance . . . roller bearings and bronze wear plates reduce friction under heavy loads . . . splined drive shaft absorbs thrust loads. Most models can be direct connected, belt, or gear driven. Packed box or mechanical seal.



SERIES K . . . Pressures to 150 P.S.I.—Capacities ¾ to 50 G.P.M. Compact, yet sturdy enough to handle a wide range of jobs. Self-lubricated by liquid being pumped . . . handle total suction lifts up to 25 feet . . . come equipped with mechanical seal or packed box, with or without relief valve. Easy to install and apply.

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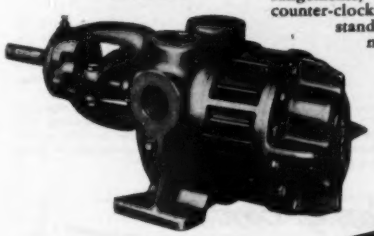

SERIES F... Pressures to 300 P.S.I.—Capacities 1 to 300 G.P.M. Popular pumps that feature 4-port design (eight optional piping arrangements, 4 for clockwise and 4 for counter-clockwise rotation.) Supplied in standard or stainless steel fitted models to suit specific needs. Furnished with or without relief valve, with mechanical seal or packed box. Ideal for hydraulic power generation in a wide range of applications.

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COMPANY_____

exhaust operates only on unleaded gasoline. For maximum efficiency it is recommended that catalyst be replaced every 3000 hr of operation. Cost of exhaust varies with size of engine on which it is installed and ranges from $140 to $220. Oxy-Catalyst Mfg. Co., Inc., 115 S. Conestoga Rd., Wayne, Pa.

BOILER BLOW-OFF VALVE

Straightway Y-type, for pressures up to 600 lb

The head, or disc, of this valve is H Monel metal and the seat is Monel, a combination described as well suited to withstand erosive and corrosive conditions to which a slow opening blow-off valve is subjected. The seat, which is renewable, has upper and lower sealing gaskets. The stem is stainless steel and the stem nut is bronze.

Construction of this valve is identical to that of company's angle blow-off valve and all working parts are interchangeable. Valves come in 1½, 2 and 2½ in. sizes in cast iron or cast steel. Dept. 21, Everlasting Valve Co., 49 Fisk St., Jersey City, N. J.

CONVEYOR UNIT

For continuously removing metal chips, borings or turnings

Chip-Tote Conveyors are designed to carry off metal chips from operating automatic or multiple-spindle production machines and eliminate periodic shut-down for manual scrap removal. Incorporating hinged steel conveyor belting, the Chip-Tote handles hot, heavy, wet or dry chips or turnings.

Chips are funneled into the conveyor belt and carried horizontally until clear of machine's operating mechanism — then transported up incline of conveyor for discharge into tote boxes or a carry-off system. Conveyor's speed can be synchronized with metal-removing capacity of the machine it serves. May-Fran Engineering, Inc., 1715 Clarkstone Rd., Cleveland 12, Ohio.

HIGH CAPACITY CONDENSER

Rated at 300 t, is economical unit for large refrigeration plants

This Aeropass Condenser, like company's smaller units, makes use of the Duo-Pass, a pre-cooling coil by which refrigerant gas first passes through pre-cooling coils on top of the structure. These coils remove superheat, reduce gas temperature and condense oil vapors to provide for easy removal of oil from the system by separator drums which are next in line.

Since superheat has been perviously removed, there is no tendency for salts to precipitate and clog condenser coil banks, company points out, and as only the water evaporated is consumed, water savings are possible.

This high-capacity equipment is compact, measuring 14 by 13 ft in area and 18 ft high, and its over-all weight is 20 t. It may be installed on roof or ground and is recommended for plants above 400 t refrigeration. Niagara Blower Co., 405 Lexington Ave., New York, N. Y.

SEPARATOR

For cleaning compressed air by means of centrifugal force

The Airfuge removes 99 per cent of impurities from compressed air without pressure drop, according to manufacturer. Moisture, oil, scale and other solids are whirled outward to the walls of the unit where they drain down to the trap section; at the same time the clean, dry air passes to the feed line or tool. A float-operated trap is provided to automatically release accumulated liquids as they rise to a level above that necessary to effect a seal, and the drain valve outlet is tapered to prevent stoppage. Separator comes in seven inlet and outlet tapping sizes from ½ to 2 in. The Swartwout Co., 18511 Euclid Ave., Cleveland 12, Ohio.

CURRENT TRANSFORMER

For outdoor use, can be mounted vertically, horizontally, inverted

The Type KO is designed for high accuracy in metering and heavy duty relay application. Both primary leads are brought out to blade type terminals

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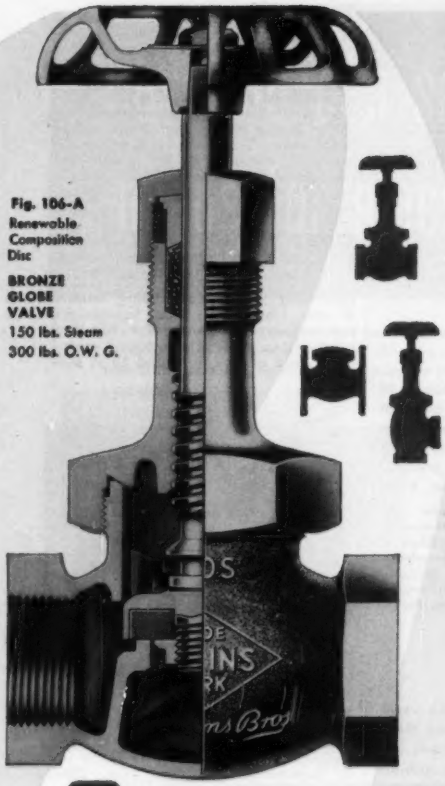


Fig. 106-A
Renewable Composition Disc

BRONZE GLOBE VALVE
150 lbs. Steam
300 lbs. O.W. G.

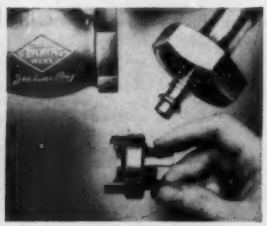
JENKINS FIG. 106-A "FAMILY"

Start with the standard Fig. 106-A. Trimming is interchangeable in Globe or Angle body, screwed or flanged.

For Close Control — In throttling service, the nut which holds the disc in the disc holder is removed and replaced with Throttling Nut, Fig. 344.

For Quick Opening and Closing — Merely substitute the bonnet and spindle from Fig. 941, in which threads are pitched more sharply.

For Lift Check Service — Globe or Angle Bodies can be fitted with interchangeable Cap, Disc Holder, and Guide Disc Nut from Fig. 117A. Addition of spring from Fig. 635A provides spring loaded service.



For Stop & Check Service — Use the 106A trim, but substitute this spindle from Fig. 630A and replace the regular disc nut with the check valve guide disc nut.

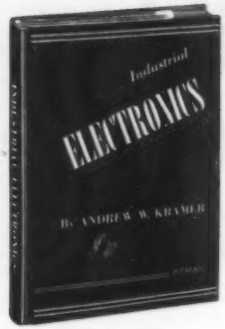
Look over these pictures and see how easy it is to make up just the valve type you need, simply by interchanging parts. Think of the saving this means in maintenance expense . . . in reduced inventory of spare valves in your stockroom.

That's a big reason why the Fig. 106-A series takes top honors in any poll for valve preference. And Jenkins time-proved design, makes them the longest-lasting, lowest-upkeep valves that money can buy.

For example, see the heavy construction of the one-piece, screw-over bonnet. You can remove and replace it over and over again without distortion. See the extra size packing box,—and the perfectly machined threads on the heavy manganese bronze spindle, with more threads in contact with the bonnet, open or closed.

Remember, Jenkins Bros. is the originator of the renewable composition disc valve,—the *only* manufacturer of both valves *and* discs. For drop-tight, trouble-free performance, get acquainted with the Fig. 106-A "family". Despite their extra value, *you pay no more* for Jenkins Valves. Jenkins Bros., 100 Park Ave., New York 17, N. Y. Jenkins Bros., Ltd., Montreal. Sold through leading Industrial Distributors.

JENKINS VALVES



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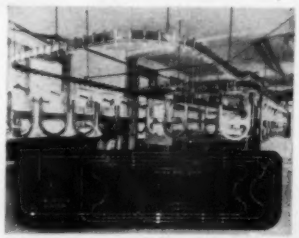
LIGHT WEIGHT CONVEYOR

Can be operated as bench, overhead or even portable system

Flexibility is the outstanding feature of the Champion. This lightweight, monorail-type conveyor for handling relatively light parts is packaged equipment, sold in 2, 4, 6, 8 and 10 ft sec-



tions, with ells etc., similar to standard pipe. Manufacturer says you can set it up as simply as an "Erector" set and rearrange it as your plant needs change. It will cost you about $3.85 per ft for any flow route. It weighs approximately 3 lb per ft and there are about 3 hangers per ft. Capacity is 25 lb per ft. Lightweight Conveyor Co., 18690 Lauder Ave., Detroit 35, Mich.

PROCESS PUMPS

In 12 sizes with capacities from 10 to 1000 gpm, heads to 325 ft

Type Q Pumps are designed for use with Dowtherm, hot oil, condensate, propane, butane, gasoline, chemical and process liquors at temperatures to 800 F. Standard models include bronze fitted, all iron, all bronze, steel and stainless steel.

Although construction materials vary according to application, all pumps in this line have vertically split casing with centerline support, a deep water-jacketed stuffing box, a special sleeve construction to prevent leakage. Pumps are easily dismantled and re-assembled without disturbing piping or alignment, company says, and meet NPSH requirements, Available with open, semi-open or enclosed impellers. Economy Pumps, Inc., Hamilton-Thomas Corp., Hamilton, Ohio.

12-TON CRANE

Is compact unit available with cantilever or strut type boom

Operating economy is a feature of this new self-propelled crane. It's powered on the gasoline-electric principle for smoothness and precision operation, company points out, and runs on as little as 8 to 10 gal per day. Over-all dimensions are 13 ft 1 in. by 8 ft 3 in. and the tail swing of the superstructure is restricted to 6 ft 6 in. Crane can be supplied with double drums for clamshell operation and a magnet in-

How you can safely cut your stockpile needs for machine part replacements

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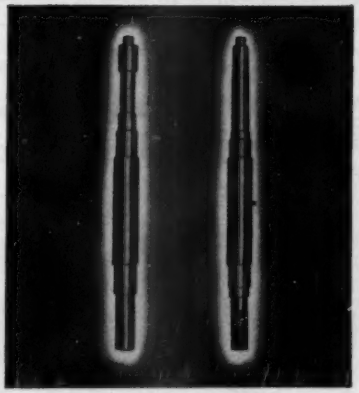

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stallation can be furnished. Boom lengths available to 60 ft. Coles Cranes, Inc., 43 S. Paulina St., Chicago 9, Ill.

PLASTIC AIR FILTER

For forced draft hot air furnaces and air conditioning systems

Taking advantage of the dielectric properties of polyethylene and other plastic materials, this new self-charging electrostatic air filter is reported to catch even microscopic solids in cigarette smoke. The plastic material used in the filter is a thin film shredded into a porous mass. When exposed in a current of air it picks up an electrostatic charge to attract and retain fine dust, soot or smoke particles.

This new filtering principle is said to differ from most filters now in use in that it collects foreign matter throughout its entire mass, not only on the air entrance side.

Company says it can be cleaned and fully regenerated by immersion in water containing a detergent and replaced immediately. The Goodyear Tire & Rubber Co., Akron, Ohio.

V-RING PACKING

Made of Teflon, offers both chemical and design advantages

Chemiseal 810V is said to combine chemical inertness, heat-resistance and toughness of Teflon with a design that gives the solid Teflon unusual mechanical resiliency to permit a tight seal at low gland pressure with minimum friction. Light gland loading, plus Teflon's natural slipperiness reduces torque required to operate the valve, company adds, and Chemiseal 810V won't "freeze" a valve even when unoperated for long periods.

Serviceable throughout the range of -150 to 550 F, this packing is suggested for hand-, air- or motor-operated valves, for emergency shut-off service, for slow-speed reciprocating pumps. Supplied as a series of V-shaped rings, in sets or bulk, Chemiseal 810V is available with square-end adaptors. Teflon Products Div., United States Gasket Co., P. O. Box 93, Camden, N. J.

PORTABLE A-C WELDER

Is silicone insulated and equipped with automatic starting control

Silicone insulation incorporated in the 6WK30J Series of standard a-c welders is claimed to afford a high margin of safety and operating dependability since it is not affected by high temperatures and is water repellent. Coils stay cool, company says, and use of this welder is not limited to 4-hr operation.

Instant arc striking without manual adjustment is credited to the Hot Start control, which provides correct amount of boost for any specific current range. This control — a hermetically sealed gas-filled time-delay magnetic switch and wound resistor — causes a surge of increased current to flow through the welding leads. This surge is present only during the starting period and its degree is higher at low "hard-to-start" currents.

Compact in size, the welder is 17 in. dia, 35 in. long. It has a current range from 40 to 375 amp, accommodates electrodes from 3/32 to ¼ in. Chemical Dept., General Electric Co., Pittsfield, Mass.

TURBINE BLOWERS

With all-steel turbines, for steam conditions to 600 psig, 750 F

While retaining their compactness and light weight, these improved blowers have fan impellers of airfoil design and streamlined air entry for high efficiency and quiet operation. Bearings and lubrication are automatically air cooled. For installation in almost any location, for oil burner applications they can be bolted to the front windbox without additional supports. These blowers can also be furnished for vertical down discharge, or for cementing into boiler brick work. They are said to be ideal for capacity regulation through speed variation. Available in capacities to 70,000 cfm or statics to 20 in. water. L. J. Wing Mfg. Co., Linden, N. J.

PORTABLE SPOT WELDER

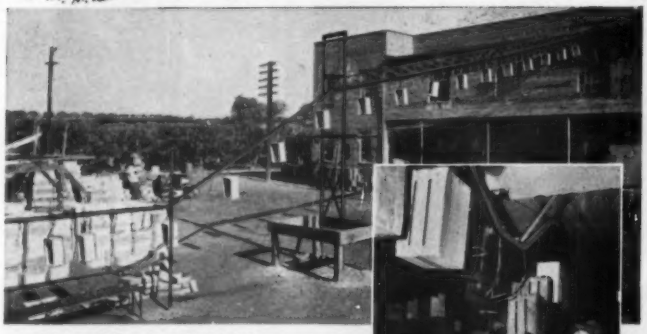
Offers automatic switch control and increased versatility

More power, faster welding and easy handling are features stressed for the Model BW. Although weighing only 33 lb, it can weld up to ¼ in. combined thickness of mild or stainless steel, or two pieces of 16-gage galvanized metal with a combined thickness of ⅛ in.

The copper welding arms come in three interchangeable lengths — 6, 12 and 18 in. and in special shapes and sizes. Water-cooled arms and tips are available for heavy-gage intermittent production, and the welder can be operated with a timer if desired. When mounted on metal stand this welder

(Continued on page 87)

"ZIG-ZAG"—the conveyor as flexible as a KID'S CONSTRUCTION KIT



Fruit boxes being returned by ZIG-ZAG conveyor from packing plant to redistributing yard for return to orchards.

R-W

Zig-Zag Continuous Power Conveyors Raise Plant Productivity ... Lower Costs

Interior of fruit packing plant showing "dumper" hanging emptied boxes on ZIG-ZAG hooks for movement to yard.

Indoors or out, there's practically no limitation to the purposes for which ZIG-ZAG Continuous Power Conveyors by Richards-Wilcox can be used. ZIG-ZAG, the conveyor that has revolutionized materials handling in industry, is adaptable to almost every plant condition or layout, and is the last word in flexibility.

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Yes, an R-W ZIG-ZAG Conveyor System, once you decide to use it for a different purpose than originally intended, in another part of your plant, can be taken down and put up again as easily as a kid makes changes with his construction kit. You can take it down here—put it up there—and in most cases use *all the parts!*

And ZIG-ZAG *quickly pays for itself*. So, find out at once how an R-W ZIG-ZAG Conveyor can raise productivity and lower costs in *your* plant. For a prompt engineering consultation, with no obligation, contact our nearest office today.

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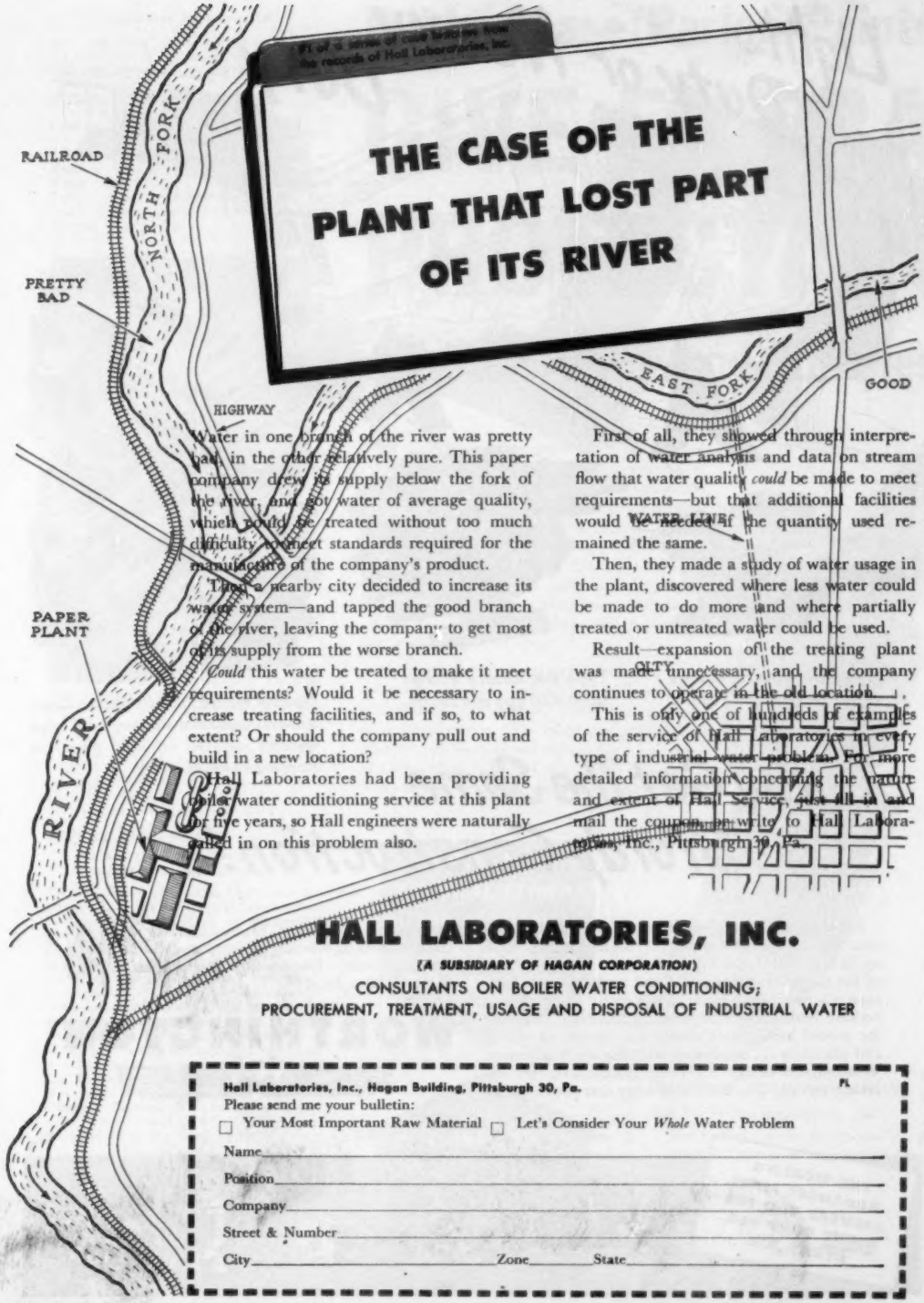


#1 of a series of case histories from the records of Hall Laboratories, Inc.

THE CASE OF THE PLANT THAT LOST PART OF ITS RIVER

Water in one branch of the river was pretty bad, in the other relatively pure. This paper company drew its supply below the fork of the river, and got water of average quality, which could be treated without too much difficulty to meet standards required for the manufacture of the company's product.

Then a nearby city decided to increase its water system—and tapped the good branch of the river, leaving the company to get most of its supply from the worse branch.

Could this water be treated to make it meet requirements? Would it be necessary to increase treating facilities, and if so, to what extent? Or should the company pull out and build in a new location?

Hall Laboratories had been providing boiler water conditioning service at this plant for five years, so Hall engineers were naturally called in on this problem also.

First of all, they showed through interpretation of water analysis and data on stream flow that water quality *could* be made to meet requirements—but that additional facilities would be needed if the quantity used remained the same.

Then, they made a study of water usage in the plant, discovered where less water could be made to do more and where partially treated or untreated water could be used.

Result—expansion of the treating plant was made unnecessary, and the company continues to operate in the old location.

This is only one of hundreds of examples of the service of Hall Laboratories in every type of industrial water problem. For more detailed information concerning the nature and extent of Hall Service, just fill in and mail the coupon, or write to Hall Laboratories, Inc., Pittsburgh 30, Pa.

HALL LABORATORIES, INC.

(A SUBSIDIARY OF HAGAN CORPORATION)

CONSULTANTS ON BOILER WATER CONDITIONING;
PROCUREMENT, TREATMENT, USAGE AND DISPOSAL OF INDUSTRIAL WATER

Hall Laboratories, Inc., Hagan Building, Pittsburgh 30, Pa. PL

Please send me your bulletin:

☐ Your Most Important Raw Material ☐ Let's Consider Your *Whole* Water Problem

Name_____

Position_____

Company_____

Street & Number_____

City_____ Zone_____ State_____

Light Duty or Heavy Duty

Type GA Rotary Pump: Up to 50 gpm and 100 psi.

Type GR Rotary Pump: Up to 5000 gpm and 500 psi.

Double Helical Herringbone Gear Rotors: Quiet and efficient; extra large wearing surfaces; no axial thrust; no trapping of liquid.

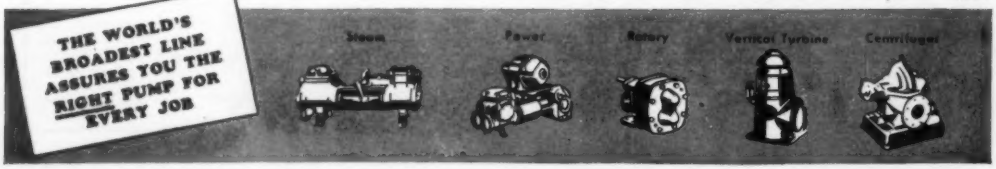
. . . You Get The Same Sturdy Construction!

For light duty pumping of hot or cold, thin or viscous liquids, use the Type GA . . . for heavy duty, hook up its big brother, the Type GR. Either way you're sure of the ruggedest construction and smoothest performance it's possible to build into a rotary pump. That's because both these hard working huskies incorporate the special herringbone rotors that operate so quietly and efficiently . . . combining with the whole advanced Worthington design for long, trouble-free, money-saving service. Get the whole story that proves *there's more worth in Worthington.* Write, describing your requirements to *Worthington Pump and Machinery Corporation, Reciprocating Pump Division, Harrison, New Jersey.*

WORTHINGTON

P-6-2

THE WORLD'S BROADEST LINE ASSURES YOU THE RIGHT PUMP FOR EVERY JOB



(Continued from page 84)

can be used as a stationary model. Greyhound A. C. Arc Welder Corp., 606 Johnson Ave., Brooklyn 6, N. Y.

ROLLING PLATFORMS

For overhead work, are built of aluminum ladders and scaffolding

These rolling scaffolds are described as easy to erect and compact to store. Four pins lock the planing with the ladder rungs and four nuts fasten the angle braces. Available in two standard widths — 12 and 20 in. — and in lengths to 24 ft for the wider width, and maximum height is 20 ft. Special size units can be ordered. Ladders have 4-in. free rolling casters with locking device. Louisville Metal Products, Inc., 1101 W. Oak St., Louisville, Ky.

CONCRETE DRILL BITS

Extra short rotary type, for drilling holes for shields, anchors

Stubbies have an over-all length of 4 in. and come in sizes for drilling holes from ¼ to ⅞ in. dia in increments of 1/16 in. They have shank diameters of ¼ to ½ in. and may be used in electric drills, air motors or hand brace. Because of their sintered tungsten-titanium carbide inserts, Stubbies are claimed to penetrate concrete and masonry at high speeds and require less pressure. Inserts and drill are same diameter. Concrete Termite Drill Co., 2095 Foothill Blvd., Pasadena 8, Cal.

AIR LINE FILTER

To protect control mechanisms or tools from dirt, moisture

The Model 3084 has a filtering element composed of hundreds of laminations of a fine, newly developed material. The filtering area is described as adequate for full air flow even after long periods of use, and trapped moisture can be removed through a drain cock. Filter comes in ¼, ⅜ and ½ in. pipe sizes and pipe connections are the straight-in-line type. A. Schrader's Son Div., Scovill Mfg. Co., Inc., 470 Vanderbilt Ave., Brooklyn 17, N. Y.

AUTOMATIC DOORS

Are available for electronic approach or remote control

Prest-O-Matic Industrial Doors are intended for use wherever operational flow requires continual or occasional passage through exterior or interior door openings. These doors come in standard sizes from 6 to 10 ft in both width and height and are "packaged" for installation by plant or local labor. They fold open to minimize operational space and open or close quickly. Advantages claimed for them are the prevention of delays in busy door openings and excessive temperature losses, and the minimizing of drafts. They're said to be especially desirable for air conditioned premises, and can be furnished with metal covering. Clark Door Co., Inc., 188 Rose St., Newark 8, N. J.

PLASTIC BANDAGING TAPE

Protects bandaged dressings from oil, water, dirt and foreign matter

Thin and pliable, Easitape appears to be uncoated, but is actually coated on both sides with compounded Hycar latex to enable the tape to seal quickly and stay sealed. It's not sticky, company points out, and it leaves no resi-

Rubber-base (Parlon®) Paints

GIVE EXTRA PROTECTION

against Acids and Alkalies

Where other paints fail because of acid or alkaline plant conditions, it may pay you to specify corrosion-resistant, rubber-base paints. For concrete and most metal surfaces, paints properly formulated with "Parlon" (Hercules Chlorinated Rubber) are unsurpassed for resistance to common destroyers of maintenance paints. Besides alkali and chemical resistance, these paints have outstanding wear resistance, dry fast, and are easy to apply.

More than 500 paint manufacturers now offer one or more rubber-base paints made with chlorinated rubber. These maintenance paints may cost a little more per gallon, but usually cost far less per square foot per year. We'll be glad to supply the names of several firms in your locality who can advise you.

WITHSTAND CHEMICAL ATTACK AND ABRASION *OUTSIDE* THE PAINT FILM

WITHSTAND CHEMICAL ATTACK AND LIFTING *BENEATH* THE PAINT FILM

HERCULES POWDER COMPANY

966 Market St., Wilmington, Del.

Send further details on "Parlon" paints and names of suppliers.

Name_____

Company_____

Address_____

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CR51-1

due or stain, won't come loose in oil or water and may be washed repeatedly. B. F. Goodrich Chemical Co., 324 Rose Bldg., Cleveland 15, Ohio.

TEMPERATURE CONTROL

For heating or cooling by means of water, oil, steam, other fluids

The Sterlco Series 150E Temperature Control Valve is a self-contained unit consisting of a compact, sturdy bellows-packed valve with stainless steel trim, monel bellows, capillary tube and thermostat bulb. Flow through the valve is automatically modulated in accordance with bulb temperature and constant temperature (adjustable over wide range) can be maintained. Built in direct acting and reverse acting styles, the valve comes in ⅛, ¾ and 1 in. sizes for maximum pressure rating of 125 psi. Industrial Control Div. Sterling, Inc., 3738 N. Holton St., Milwaukee 12, Wis.

STORAGE BINS

In two styles, make small parts easy to see and easy to reach

The Model 700 is a wall unit with 100 separate compartments, all tilted forward and built on the "cash drawer" principle with rounded bottoms to make parts easier to pick out. This unit is 56 in. high, 44 in. wide, and 12 in. thick. The Model 320 is an island bin with compartments on both sides, providing 320 separate compartments in a unit 65 in. high, 44 in. wide and 20 in. thick.

Both bins are built of 18 and 20-gage steel and painted in buff and maroon. All compartments carry tag holders, and may be lifted from the rack for stock rotation and cleaning. Service Parts Systems, 4607 St. Aubin St., Detroit, Mich.

TELEPHONE POWER SUPPLY

Has sufficient d-c capacity to handle both talking, ringing current

The Type ZF3DP Power Supply is for use on existing private telephone systems and consists of a properly filtered full-wave selenium rectifier. Operation is from 115 v 60-cycle a-c- line with 3 amp d-c output capacity. Taps are provided for 2, 10 and 12 v. Also provided is an 8 v a-c tap for operation of a-c buzzers or other equipment.

Use of this power supply eliminates necessity for dry cell batteries. Enclosure is a ventilated pressed steel wall mounting case. Line switch and fuse are standard. Costs $85.00. Electronic Rectifier Co., Inc., Rochester, N. Y.

Let the Bradleyman Help You Modernize or Enlarge Your Washroom Facilities

Where space is limited, Bradley semi-circular Washfountains will meet requirements. Each serves 4 to 6 persons. Foot-control and self-rinsing bowl provide the utmost in sanitation and prevent water waste.

● The Bradleyman draws upon the experience gained by serving an ever-widening group of Bradley users for over 30 years. His practical suggestions for washroom layouts and use of Bradley group-washing fixtures can help you find the most economical way to provide adequate facilities in a minimum of space.

Bradley 54" Washfountains accommodate 8 to 10 persons simultaneously—replace 8 to 10 single-person basins. Piping connections are reduced 80% and one sprayhead replaces as many as 20 faucets. Maintenance and water consumptionarereducedsharply. Foot-control stops contagious washbasin contacts and promotes a new high in employee health and safety. BRADLEY WASHFOUNTAIN CO., 2371 W. Michigan Street, Milwaukee 1, Wis.

Illustrated Catalog 4701 sent promptly on request.

BRADLEY washfountains

Sold Through Plumbing Wholesalers

Television in Industry

(Continued from page 60)

since the introduction of industrial television was the recent joint announcement of Remington Rand, Inc., and the Columbia Broadcasting System that color television for industrial use has been developed and would soon be available. Under the terms of an unusual cooperative agreement, Remington Rand has been authorized as the exclusive manufacturing and sales agent for the equipment which was designed and patented by CBS. The new system, trade-named Vericolor, operates on the same principles as the CBS color system recently approved by the FCC for commercial broadcasting and could be used for that purpose.

The unit comprises a simple, compact, lightweight color camera which can be handled by a single operator; a control unit with its own color monitor; plus as many additional color monitors as may be required.

Vertical Transportation

(Continued from page 50)

tables. A schematic layout of a ferris-wheel elevator would resemble a long, vertical oval, with a number of tables attached to the long sides of the oval. Since the tables are suspended from the top, they always remain in a horizontal plane; consequently, the carried loads are transported in exactly the same relative position in which they started. Loads can be put on, or taken off this type of elevator either manually or automatically.

Naturally, if the operation is automatic, the whole system must be synchronized to function properly. Any plant which has to move relatively small articles vertically, and which handles a uniform sized article, can well apply this equipment.

(Continued on page 91)

ERIE CITY INTRODUCES

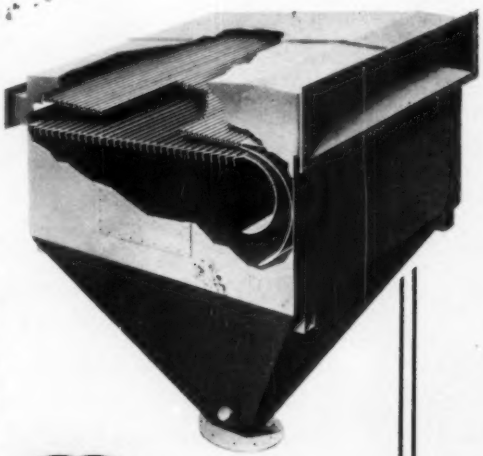
ERIE CITY KEYSTONE STEAM GENERATOR

- A 2-drum water tube boiler + automatic oil and gas burner + induced draft fan + operating and safety controls

For complete specifications - Write for Bulletin SB-38.

ERIE CITY IRON WORKS *1441 East Ave.* **ERIE, PA.**

"What?... an efficient Dust Collector designed especially for small boilers from 100 to 2000 BHP?"



THERE SURE IS.....

The *new* Buell "LR" Fly Ash Collector gets 99% of all 100-mesh cinder discharge!

Boasts draft loss so low, you can even use it effectively on natural draft boilers!

For full information on how the Buell "LR" Collector can help solve your Fly Ash Problem, write today to: Buell Engineering Company, Suite 5031, 70 Pine Street, New York 5, N. Y.

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Engineered Efficiency in **Fly Ash Collection**

A word of caution should be mentioned concerning the installation of this type of equipment. Most states require separate, fire-proof, detached shafts, or hatches, for any equipment which cuts through a building vertically. The fire-control angle is obvious; therefore, the cost of constructing a separate hatch must be considered when selecting equipment for vertical transportation.

A modification of the above mentioned equipment is a reciprocating-lift, which is just what the name implies: an automatic device for shuttling back and forth, vertically, to move load-units between floors. This equipment is adaptable only to the movement of uniform-size packages, for a relatively short distance. With such a device, automatic loading and unloading features must be provided, to make it serve its purpose to best advantage.

Summarizing the general scope of vertical transportation, let it be stated that extreme care must be exercised in the selection of equipment. Complete data must be available, on the following items, before the proper equipment selection can be made: 1. Commodity to be handled: size, shape, weight; 2. Length of travel; 3. Speed of travel; volume in a given period; 4. Method of loading and unloading; 5. Associated equipment involved with, and tied into, the vertical movement; 6. Costs of movement by other means; 7. Desirability of independent handling; 8. Amortization of cost of equipment.

Certainly, advantage must be taken of gravity in vertical movements of materials. And, if possible, the equipment must be completely automatic, to justify its use as a labor-saving device.

Battery Repair

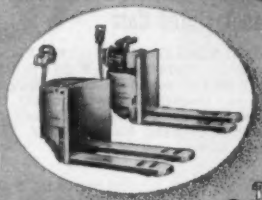
(Continued from page 59)

tional lead is added and the entire cavity filled approximately 1/16 in. above the top of the connector.

In the same operation, the tip of the burner is run around the top of the work between the molten lead and the solid lead of the connector head, causing these two surfaces to fuse together. Then the carbon is removed and the connection allowed to cool undisturbed. In cooling, the lead will shrink slightly and after becoming solid will be level with the top of the connector. Do not move or disturb the joint during cooling as this may cause the lead to crystallize and result in poor electrical contact.

To determine if the burn was properly made, grip the connector with pliers after the burn has cooled and endeavor to remove the connector by pulling straight up. If it is possible to pull the connector off, the burn was improperly made and the weak point or cause of failure may be seen by examining the two surfaces that pulled apart.

MORE *Power* for Manpower IN EVERY CLARK MACHINE



STEADILY RISING COSTS—growing user demands—imminent labor shortages! These very real conditions need not pose frightening problems to alert and able management. Given proper machines, manpower can deliver a great deal *more* power—and enjoy doing it; more power that translates into greater production at lower cost. Now that CLARK has added Powered Hand Trucks to its *Leadership Line* of Fork Lift Trucks and Industrial Towing Tractors, it is better fitted than ever before to help Management meet the challenges of a most critical era. For it is in the field of Materials Handling that the greatest opportunities for savings, for increased production, for improved efficiency and for the betterment of employee relations are to be found. In every piece of CLARK materials-handling equipment, there is MORE POWER FOR MANPOWER. And it is yours to employ—yours to enjoy.

CLARK will exhibit at the Plant Maintenance Show, Cleveland, Ohio, January 15-18, 1951.

Let us send you a concise, easy-to-read catalog on CLARK'S Leadership Line. Just fill out and mail the coupon.

CLARK ELECTRIC AND GAS POWERED FORK TRUCKS
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is worth waiting for...

The HALLOWELL Cabinet Bench has more "custom" features than any other stock bench we know of. All-steel construction, several top materials, ample storage space, standardized multiple units and accessories and true good looks make it well "worth waiting for."

WRITE FOR BULLETIN 702

-SPS-

STANDARD PRESSED STEEL CO.

JENKINTOWN 26, PENNSYLVANIA

NEW BOOKS for the plant engineering staff

Manufactured Cold

REFRIGERATION ENGINEERING by H. J. Macintire and F. W. Hutchinson. Second edition. Size 6 by 9 in.; 601 pp; illustrated; cloth bound. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Price $6.50.

THIS NEW second edition, based on plans and ideas formulated by the late Professor Macintire, was written in collaboration with F. W. Hutchinson. It contains new material on transient phenomena in refrigeration, heat pumps, radiation effect on cold storage temperatures, and comfort panel cooling systems.

As a result of revision, modernization and expansion about one-half of the material in this edition is entirely new. Eight chapters have been added, over seventy additional illustrative figures are included and there are over 200 problems of which 160 are new in this edition.

In addition, there are over 30 full-page graphical solutions giving direct-reading values of the film coefficient of heat transfer for most of the commonly-used refrigerants when being heated or cooled as either a subcooled liquid or a superheated vapor.

Study Man's Characteristics to Design Machines

HANDBOOK OF HUMAN ENGINEERING DATA for Design Engineers. Prepared by Tufts College, in cooperation with Technical Publications Div., Jackson & Moreland, Engineers, Technical Report SDC 199-1-1. Size 8½ by 11 in.; 400 pp; loose leaf bound; plastic cover. Available through Office of Technical Services, Dept. of Commerce, Washington 25, D. C. Price $5.00.

WHILE THE man-made engine is capable of ever increasing power, scope and speed of operation, the characteristics of the individual—the human machine—have not changed in the memory of man and will not change for countless generations to come. Because of this, design engineers will have to design machines of the future giving serious consideration to man's capabilities.

This handbook is the first report on a study of human beings in relation to machines. It is too often assumed that man can learn to do anything, but human beings, as control devices for machines, reach a point at which their human performance and sensitivity may break down. Machines of the future may be designed with these limitations in mind.

The eight parts of the book cover such subjects as vision, audition, skin sensitivity, motor responses, etc. In each part there is some discussion of basic concepts and analysis of information resulting from tests on human beings.

An example of this can be seen from section on basic characteristics of vision, there is discussion of the human being's sensitivity to light, his discrimination of brightness, his perception of depth and of color, his response to intermittent stimulation and his perception of motion.

Get a Good Foundation From the Ground Floor Up

FOUNDATIONS OF STRUCTURES by Clarence W. Dunham. Size 6 by 9 in.; 679 pp, including index and appendix; illustrated; cloth bound. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y. Price $7.50.

THIS IMPORTANT textbook should prove very helpful to civil engineering students as it discusses in considerable detail the planning and dimensioning of foundations for structures.

It shows how to obtain and interpret data regarding soils, how to plan the support of a structure upon them, and how to devise means for the construction of that foundation.

Some chapter headings are mentioned to give you an idea of the scope of material covered: soils as foundation materials; spread footings; mats; piles; foundations subjected to overturning forces; caissons; bridge piers; and others.

A wide variety of foundation problems are included, aimed specifically at developing in the reader the ability to plan and design safe and practical substructures by the use of sound engineering judgment.

Guides for a War Economy

POLICIES AND CONTROLS IN A WAR-BURDENED ECONOMY. Size 6 by 9 in.; 21 pp; paper bound. Available from Economic Research Dept., Chamber of Congress of U.S.A., Washington 6, D. C. Price 25 cents.

WHAT WILL the policies and controls be should the war situation worsen? This report sets forth a comprehensive statement in outline form of the essential basic policies to increase supplies in the war economy and to minimize the inflationary effects of an expanded military program.

It contrasts our economy today

what's the Greatest Nuisance in pump maintenance?

- ✓ Periodic lubrication?
- ✓ Leaky stuffing boxes?
- ✓ Handling repairs in your own plant?

You can get rid of all three with a new De Laval GS Pump

Because —

We've eliminated lubrication.
Like many modern motors, the GS Pump has pre-lubricated bearings. You can throw away the grease gun and tear up your lubrication records.

We've elminated stuffing boxes.
Why fuss with tightening, packing and repacking stuffing boxes? The mechanical seal on the GS Pump is simple, effective and proven.

We've eliminated field repairs.
Every working part of the GS Pump . . . every part subject to wear, is contained in one easily replaced rotor assembly. Through our Service and Exchange Plan new rotors are available for immediate shipment from stock. Put the new one in and return the old one for credit on serviceable parts—Or, if you wish, exchange the entire pump for a factory rebuilt and guaranteed pump.

Capacities . . to 400 gpm—Heads . . to 230 ft.—3 Sizes . . 2½" to 4"

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DE LAVAL STEAM TURBINE CO.
TRENTON 2, NEW JERSEY

Just drop the coupon in the mail for full details of this outstanding new pump development. **GP-24**

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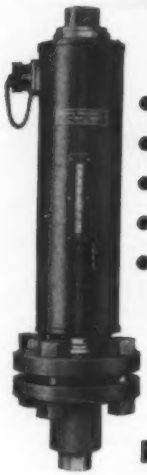
by Liquid Density



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NEW PRINCO DENSITROL INDICATES, RECORDS, AND/OR CONTROLS LIQUID DENSITY. This rugged plant production tool has the sensitivity of a laboratory instrument, can be adapted to ranges as small as 0.005 density full scale.

Write for Bulletin W-2 or outline your requirements direct to

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PRECISION THERMOMETER & INSTRUMENT CO.

1402 Brandywine St., Philadelphia 30, Pa.

with that at the beginning of World War II; it outlines various methods of increasing supplies; discusses reduction of spending power and excessive demand; and comments on indirect measures versus direct controls.

Although it is not intended to be the panacea of our war economy, the report sets down guides which should be considered.

New Publications For Civil Defense

Three recent releases on Civil Defense are of immediate interest. "Fire Effect of Bombing Attacks" (NSRB Doc. 132) is a 45 pp booklet available from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 15 cents. Fire accounted for 80 per cent of the total damage from aerial bombing during the last war. The booklet is divided into two parts. The first is a survey of fire warfare in World War II based on the U. S. Strategic Bombing Survey. The second part is a study of factors in fire susceptibility of American cities.

No instrument available today is considered satisfactory for civil defense work in connection with the indication of atomic radiation. A new 34 pp booklet "Radiological Monitoring Instruments for Civil Defense — Specifications" has been published by the Executive Office of the President, Federal Civil Defense Administration, Washington 25, D. C. This covers specifications for satisfactory low level and high level intensity indicators. It is hoped instrument manufacturers will modify present instruments or develop entirely new ones to meet these requirements.

The same agency has also released the text of a model "Interstate Civil Defense and Disaster Compact" proposed as a legal basis for mutual aid and mobile support among states in the event of enemy attack.

Standards for Industrial Ovens Guard Against Explosions

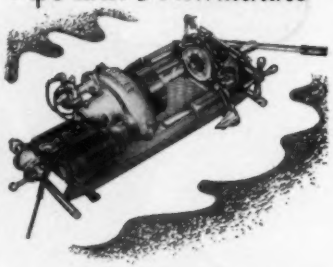
STANDARDS FOR CLASS A OVENS AND FURNACES, NFPA No. 86. Size 4¾ by 7¼ in.; 72 pp; paper bound. Published by National Fire Protection Association, 60 Batterymarch St., Boston 10, Mass. Price 75 cents.

THESE STANDARDS apply to ovens where explosive vapors may be produced from painted materials being dried or baked in the ovens, impregnated materials, coated fabrics and the like, and also where there is an explosion hazard from the fuel used.

All types of heating equipment are covered, including oil, fuel gases of various types and electricity. Box or batch ovens, continuous conveyor type ovens handling different classes of work, direct and indirect heating equipment of various types, information on flammable properties of

• LIGHTWEIGHT
• LOW-PRICED
• EASY-TO-MOVE

the New Beaver Model-E Pipe and Bolt Machine



The new low-priced, lightweight Beaver Model "E" is a "junior edition" of the heavy-duty Beaver Model A—which has, for the past 20 years, been the recognized leader in the field of portable pipe and bolt machines.

The Model "E" uses the same dieheads—the same dies—the same patented interchangeable wheel-and-roller or knife cutoff devices—the same reamer arm and cone—as the Models A and B. This will be a great advantage to thousands of shops now equipped with the Beaver Model A or B because it eliminates the necessity of carrying in stock duplicate dies and parts—thereby preventing endless confusion and needless expense. And remember, there are 195 different kinds and sizes of dies instantly available for Models A, B or E.

Although designed primarily for hardware stores and small piping contractors, BIG contractors will find the new Model "E" useful on jobs requiring extreme portability.

A pipe machine is no better than the service back of it and our 50 years of experience in this field, and our reputation for high quality and friendly service, is your best guarantee of complete satisfaction.

WRITE FOR BULLETIN E

BEAVER PIPE TOOLS

210-300 DANA AVE. • WARREN, OHIO, U. S. A.

Costs Less... Lasts Longer

ONCE again Koppers Bitumastic® Protective Coatings have proved to be an economical and effective way to prevent corrosion—this time in part of a big by-products plant where structural steel, piping and stairways are subject to the highly corrosive attack of moist, acidic gases.

Originally, structures were primed and given two coats of another brand of coating material — at a cost of $1,850. In less than one year the coating had failed.

Thirteen months ago, two coats of Koppers Bituplastic® No. 28 were applied over a coat of Bituplastic primer. Total cost was only $1,680—a saving of $170 at the start. And today, the Bituplastic coating is in good condition, saving more maintenance dollars with every day of additional service.

CORROSION PREVENTION IS OUR BUSINESS

Koppers handles the entire job of protecting industrial plants against corrosion. Here are the steps we take to keep industry's No. 1 enemy under control:

SURVEY—Corrosion experts will survey your plant and determine where protection is needed . . . how much protection is needed.

MATERIALS—Koppers offers a complete family of Bitumastic Protective Coatings . . . materials for nearly every type of corrosion problem.

APPLICATION—Trained applicators are available to make certain that Bitumastic Protective Coatings are put on correctly to give maximum service.

Write today for complete information on Koppers corrosion prevention service. Remember: 50 to 90 per cent of maintenance and replacement costs are chargeable directly to corrosion!

KOPPERS **BITUMASTIC** PROTECTIVE COATINGS

REG. U.S. PAT. OFF.

SOLD THROUGH INDUSTRIAL DISTRIBUTORS

KOPPERS COMPANY, INC., Tar Products Division, Dept. 123T Pittsburgh 19, Pa.

Which ATLAS *Temperature Regulator Do You Want?*

We offer the self-contained type, illustrated and described in Bulletin 7A. We also offer the hydraulically and pneumatically operated type — Bulletin 6A. For example, the following four are shown in Bulletin 7A:

ATLAS No. 650 is a Balanced Type Double Seat Valve. Spring Adjustment. For temperatures from 70° to 300° F. Bulb is immersed in liquid and control valve installed in steam supply. ½", ¾", and 1" for steam pressures up to 150 lb. 1¼", 1½", 2" and 2½" for steam pressures up to 100 lbs. Operates in vertical or horizontal position.

ATLAS No. 651

is a Needle Type Single Seat Valve. Spring Adjustment. For temperatures from 70° to 300° F. Used where tight seating valve is essential such as on small oil heater pump sets, open or closed tanks, sterilizers, glue heaters, etc. ½" and ¾" for steam pressures up to 150 lb. Operates in vertical or horizontal position.

ATLAS No. 655 is a Balanced Type Double Seat Valve. Lever and Weight Adjustment. For temperatures from 70° to 300° F. Lever and weight adjustment of control valve assures high sensitivity. For maintaining temperature of liquids in all kinds of tanks and heaters. ½", ¾", and 1" for steam pressures up to 150 lb. 1¼", 1½", 2", 2½", 3", 4", 5", 6", and 8" for pressures up to 100 lb. Operates in horizontal pipes.

ATLAS No. 660 is a Single Seat Self-Contained Pilot Operated Valve. Spring Adjustment. For temperatures from 70° to 300° F. For use where accurate regulation demands a quick opening and tight closing control valve and where steam pressure is always 25 lb. or more, as for instantaneous heaters and tanks for water, oil, etc. ½", ¾", 1", 1¼", 1½", and 2" for steam pressures up to 300 lb. 2½", 3", and 4" for steam pressures up to 250 lb.

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solvents and methods for calculating the needed safety ventilation are all included in this pamphlet.

The standards point the way toward safeguards which should greatly reduce the frequency of fires and explosions in this class of equipment which has figured prominently in the record of industrial fires and explosions over a period of years.

Build With a Good Foundation

CIVIL ENGINEERING HANDBOOK, edited by Leonard C. Urquhart. Third edition. Size 6 by 9 in.; 976 pp; illustrated; flexible cloth binding. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y. Price $8.50.

THE NEW EDITION presents theory and standards, practice and data, to meet the present day needs of civil engineers in solving specific problems.

Some of the revisions and additions in this third edition include material regarding photogrammetric surveying; a fluid mechanic's slant is given in the information on hydraulics; airport engineering data are given on the design of pavements for highways and airports; more attention is paid to soil mechanics in the section on foundations; and others.

From the ten big sections, each written by experienced men in their respective fields, you get a complete coverage of the civil engineering field —from city surveying and railway engineering standards through hydraulic models and bridge trusses to the design of cement mixtures and intakes and dams.

How to Measure Work

A WORK MEASUREMENT SYSTEM, DEVELOPMENT AND USE. Size 7¾ by 10¼ in.; 44 pp; illustrated; paper bound. Available from Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price 30 cents.

IT IS DIFFICULT to imagine a tangible measuring stick used to calculate an intangible such as "work," but this bulletin with the use of graphs and charts describes the methods used and the points to consider in setting up a work measuring system.

Instead of the customary stopwatch method, the bulletin uses the statistical form of work measurement. Building around an extended case history in the Army's Office of the Adjutant General, and drawing generalizations from many other sources of experience, the bulletin deals with the problems and techniques of developing and installing a simple statistical system of work measurement — a system that is readily adaptable to a variety of operating situations.

After tracing the development of the system itself, the bulletin takes

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Standards for Metallizing

RECOMMENDED PRACTICES FOR METALLIZING. Prepared by American Welding Society Committee on Metallizing. Size 6 by 9 in.; 22 pp; paper bound. Published for American Welding Society, 33 West 39th St., New York 18, N. Y. Price 75 cents.

THIS BOOKLET is the first in a series of metallizing standards to be issued by the American Welding Society. The purpose of the book is to serve as an authoritative source of information relative to the metallizing processes.

The pamphlet is prepared in two parts. The first part covers all methods of surface preparation, metal spraying procedures and finishing of sprayed metal shafts. The second part covers safety recommendations for metallizing, with regard to equipment, personnel and general precautions. It also advises safety measures to follow when using oxygen, fuel gases, and compressed air; and stresses precautionary measures during blasting, spraying and finishing.

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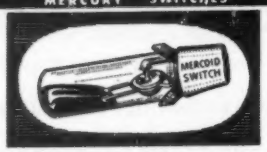

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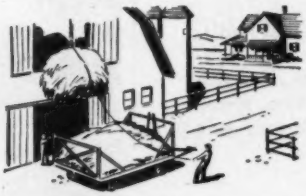

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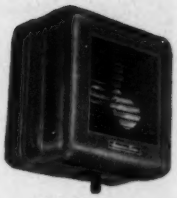

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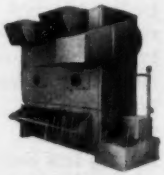

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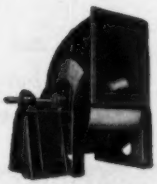

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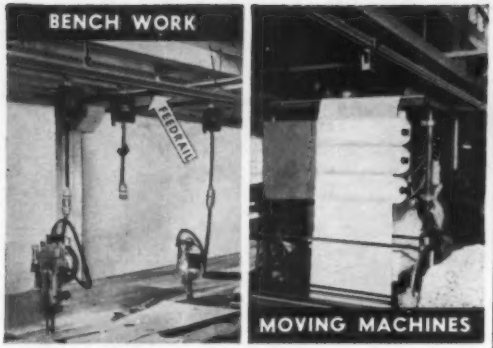

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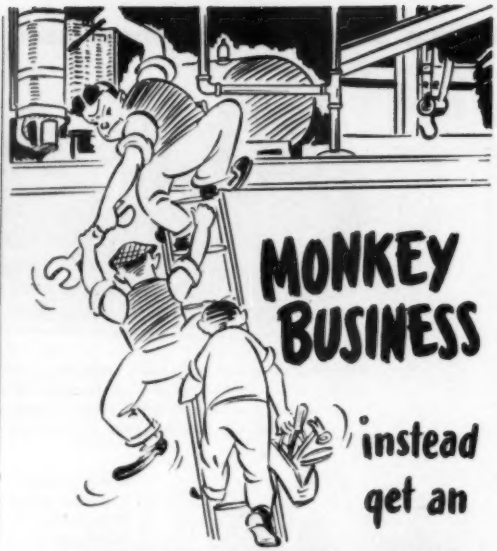

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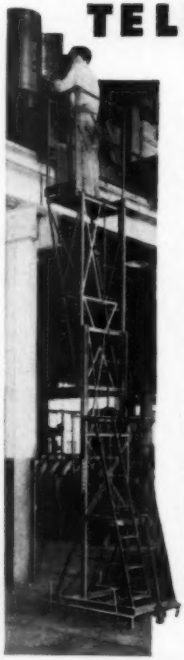

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(Continued from page 20)

accessories. Among special items listed are resistance bulbs and wells, radiation detector and its new molten metal thermocouple for ferrous metals. Standard line of thermocouples, protecting tubes, lead wire and insulators is illustrated and described. Book also includes data on checking, selecting and ordering thermocouples, wire sizes and resistances and temperature-mv curves to make it a real help in applying indicating, controlling and recording instruments. Wheelco Instruments Co.

MECHANICAL POWER TRANSMISSION

142 Brakes and Brake Motors—Construction advantages of company's brakes are featured in illustrated Bulletin SL-610-1 on brakes and brake motors. Explains how brake works and the greater wear resistance afforded by bonded metal brake linings. Dimensions of brakes, mechanical and electrical characteristics and mounting data included. Crocker-Wheeler Div., Elliott Co.

143 Speed Reducers—Bulletin 75, 16 pp, describes and illustrates worm-helical speed reducers designed for continuous operation coupled direct to electric motors and applicable to agitators, any vertical drive. Includes ratings, dimensions, standard assembly diagrams, also data on permissible overhung loads and thrust capacities. W. A. Jones Foundry and Machine Co.

144 Variable Speed Drive—Bulletin AS-1600-B3 describes company's 1 hp variable speed drive which, at 1725 rpm input offers a range of 215 to 3450 rpm. Discusses compact design permitted by tandem belt and other advantages of this drive; gives ratings and includes dimensional drawings. Worthington Pump and Machinery Corp.

145 Horizontal Speed Reducers—Bulletin 2105, 24 pp, covers company's horizontal right-angle speed reducers, giving their advantages, general specifications. Tells how to select a reducer of this type and includes AGMA service factors for electric motor drives, also ratings and capacity tables for single, double, and triple reduction units. Also gives overhung load capacities, dimensions, diagrams of standard assemblies. The Falk Corp.

146 Worm Gear Speed Reducers—Catalog 45-C, 8 pp, describes speed reducers made with horizontal worm at bottom, worm at top or vertical drive. They come in 24 sizes in ratio ranges of 5.86 to 1 to 100 to 1 and from 0.04 to 15 hp. Includes general specifications, rating tables, dimensions and price list. Also presents data on small double worm gear speed reducers. D. O. James Mfg. Co.

147 Cut-Out Couplings—Twelve-pp Catalog 50 A introduces a line of cut-out couplings offering torque sensitive protection combined with the features of a flexible coupling, and also describes a redesigned cut-out pulley line. Engineering data provided includes ratings and information on selecting proper size cut-out and on checking a cut-out installation. Photos, ordering information, dimensions included. Anchor Steel and Conveyor Co.

148 Power Transmission Equipment—A full line of pulleys, roller bearings and other mechanical power transmission equipment is described and illustrated in 48-pp Catalog 51, along with list prices, specifications and ordering information. This catalog also covers some of company's materials handling line, including casters, dollies and trucks. Bond Foundry and Machine Co.

149 Data on Universal Joints—Catalog C1 is described as a "must" for plant engineers concerned with purchase and maintenance of universal joints. Tells briefly how to select them and includes graphs on static torque tests in inch pounds, angle of operation efficiency curves, and frictional heat loss curves. Provides assembly and dis-assembly instructions, engineering data, weights, specifications, dimensions; also ordering instructions and prices. Curtis Universal Joint Co., Inc.

PUMPS

150 Boiler Feed Pumps—Bulletin 109, 16 pp, illustrated in color, describes in detail centrifugal pumps for boiler feed service. Explains and pictures construction and major parts, explaining in detail the floating seal incorporated. Capacity data is provided, also vapor pressure tables. Pacific Pumps, Inc.

151 For Controlled Pumping—Illustrated Bulletin MP-50 describes company's Mini-Pump, a controlled volume pump for handling minute quantities of clear liquids. Explains how this metering pump is designed and how it operates, giving capacities. Milton Roy Co.

152 Centrifugal Pumps—A new line of multi-stage centrifugal pumps for high pressure applications to 1200 psi and capacities to 1800 gpm are introduced in Form 7233, 16 pp. Fully illustrated with photos of assembly and parts and sectional views. It discusses pumps' radial and axial balance, sealing arrangements and mountings. Ingersoll-Rand Co.

153 Condenser Circulators — Catalog G-1050, 4 pp, describes condenser circulators in standard sizes to 100,000 gpm, special sizes to 200,000 gpm. Designed for power station service, the pumps shown are vertical, mixed flow units of large capacity and low head capable of economical handling of large volumes of water. Installations involving many types of water are pictured. New "pull-out" units which permit removal of operating parts without pulling out complete pump or disturbing pipe connections are also illustrated. Economy Pumps, Inc.

TOOLS, WELDING

154 Tool Crib Control—Revised Bulletin A-510 presents step-by-step procedure to prevent theft, hoarding and loss of tools, gages and other equipment loaned to employees; cut crib inventories; eliminate delays from missing tools; reduce breakage, and speed service and cut costs. Fully illustrated. Industrial Div., McCaskey Register Co.

155 Manual of Welding Engineering and Design—No. 1 in company's National Defense Series, this 44-pp handbook provides technical data on characteristics, properties, applications and operational procedures for company's Low-Temperature Welding Alloys and fluxes and includes some valuable information on welding in all its phases. Covers welding terminology, temperatures of application, advantages of different heating methods, design information, basic ferrous metallurgy, joining alloy selections and other subjects. Indexed and illustrated. Eutectic Welding Alloys Corp.

BOILERS, HEATING

156 Steam Boiler Unit—Bulletin 207, 8 pp, covers a fully automatic, self-contained steam generating plant incorporating a Scotch-type boiler, horizontal type burner, operating and safety controls and regularly furnished for 100, 125, 150 and 200 lb working steam pressures. Includes specifications and dimensional data, also photos of many school and hospital installations. Johnston Brothers, Inc.

157 Shop Assembled Boiler — Eight-pp Bulletin G-72 introduces company's new integral-furnace boiler which is shop assembled for unit shipment. Describes and illustrates the many advantages of this packaged unit, including its economy, ease of installation and connection, flexibility, minimum space requirements, efficient combustion, fast steaming and ease of operation. Gives sizes, dimensions. The Babcock & Wilcox Co.

158 Packaged Water Heating—Bulletin SM-41 gives ratings, specifications for five sizes of all-bronze steam mixer water heaters—packaged units, complete with accessories and controls, which mix steam directly with water to provide instantaneous hot water at controlled temperature. Also described is a combination safety unit which supplies hot water at two or more controlled temperatures for industrial wash rooms and processing, and steam-water mixers for small-capacity service. O'Brien Steam Specialty Co., Inc.

LIGHTING

159 Plant Lighting Planning Guide—This 32-pp handbook on industrial lighting presents the economics of a plant lighting program in terms of lower production costs, reduced working time, less fatigue and eyestrain, less spoilage, fewer accidents, better morale. Explains six major steps in initiating, developing and carrying out a lighting program; tells how to select equipment, and stresses the importance of maintenance. Also tells of planning assistance available. Illustrated with photos, graphs and charts, book includes a table of recommended levels of illumination for general lighting of industrial interiors. Benjamin Electric Mfg. Co.

160 Screw-In Fluorescent Light — This single-sheet bulletin tells how incandescent work lights can be converted to fluorescent simply by screwing company's fluorescent "bulb" into an ordinary lamp socket. The unit is described as not much larger than an incandescent lamp, but producing cooler illumination and more light for equal wattage. Illustrates and tells end-mount types, gives design, operating and service data. Stocker & Yale.

FASTENERS

161 Pressure Seal Rippers—Featuring a detailed description of installation procedures, this 8-pp publication presents data

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162 Locknuts and How They Work—Featuring a discussion of locknuts and their industrial importance, this 26-pp booklet shows how modern locknuts are built to withstand vibration and provide a better means of locking a nut on a bolt. Not an ordering catalog, describes and illustrates more than 20 individual types of locknuts, explaining their principle of operation and telling name of manufacturer. Industrial Fasteners Institute.

METALS, METAL TREATING

163 Cavitation Erosion—Now available is a 20-pp article "Accelerated Cavitation Research," by W. J. Rheingans, reprinted from the Transactions of the ASME. Deals with resistance of various metals to cavitation erosion and includes findings of cavitation pitting tests made with an accelerated cavitation machine of the vibratory type. These tests were run in an attempt to solve some of the phenomena of cavitation and determine relative resistance to pitting of recently developed materials. Illustrated with photos, graphs, tabular data. Ampco Metal, Inc.

164 Hard Metal Castings—Believed to be the first publication on castings made of hard metal alloys, this 16-pp booklet offers helpful information on their use, available types and how to order them. Filled with unretouched photos of rolls, bushings, bearing boxes, cylinders and other specimens, it includes approximate prices and an explanation of why the higher first cost of these made-to-order castings is justified in cases involving severe attrition, corrosion and high temperatures. Stoody Co.

165 For Longer Metal Life—Illustrated Bulletin 45A describes company's three metcolizing processes for protecting metals against heat oxidation to increase service life. Basically these processes involve the coating of steel with metalized chromium nickel alloy and/or aluminum and special sealers. The different processes are discussed and their uses given. Some actual case histories are detailed. Metallizing Engineering Co., Inc.

166 Flame Hardening Equipment—Catalog 4 is a 20-pp illustrated booklet on flame hardening apparatus, its selection, use and applications. Covers water-cooled torches, mixing heads, mixer extensions, gear hardening tips, heating torches and tips, special tips, gas control equipment. Fully illustrated with photos, sketches; includes ordering data. Air Reduction Sales Co., Air Reduction Co., Inc.

MAGNETS

167 Improved Magnets—Three new high-powered models of company's Automagnets are described in this leaflet. Among features stressed are rivated construction, improved cover, continuous hinge, insulation for confining magnetic strength to working areas and flush air gap to prevent gathering of fine iron. Dimensions, specifications and installation tips for use on wood and steel spouts included. Eriez Mfg. Co.

168 Better Lifting Magnets — Catalog B-1401-A, 6 pp, describes a new line of all-welded magnets that "weigh less, lift more and last longer," giving features, sizes, lifting capacities, dimensions and ratings. Also included is a cross-sectional drawing detailing construction features, materials and design. Types of controllers are illustrated and explained. Installation photos show some of the work these magnets are now doing. Dings Magnetic Separator Co.

OTHER EQUIPMENT

169 Standardized Steam Turbine Units—Bulletin 03B6801A, 16 pp, covers six sizes of standardized units from 11,500 to 60,000 kw—and the recommended 90,000-kw turbine. Includes photos and cross section drawings of most of the units. Features and accessories furnished are listed along with bills of material for the hydrogen-cooled and air-cooled generators. The excitation system of the standardized units is also described. Allis-Chalmers Mfg. Co.

170 The Merits of Metered Mail—A "Picture Book for Parcel Post Shippers," this 12-pp booklet features candid shots showing how metered mail can cut plant shipping costs, speed operations and save man hours, as well as keeping an accurate record of postage used. Pitney-Bowes, Inc.

171 If You Use Movies—Here's a 1950-51 catalog of free rental and sale films. This 58-pp publication lists almost 1400 16 mm sound pictures, many in color, and many of special interest to plant engineers. More than 100 of the films may be borrowed by industries at no cost except for transportation. These industrially sponsored subjects are entertaining as well as educational and book should be helpful in arranging employee movie programs. Films listed are indexed by title, classified by subject. Association Films, Inc.

172 Vibrating Screens—Concentric action vibrating screens for medium and heavy duty service, accurate sizing, thorough rinsing and rapid dewatering of a wide range of materials from ashes to zinc ore are illustrated, described, tabulated in 12-pp Book 2354. Detailed dimensions, weights, and other engineering layout data are given, including instructions for selecting right size screen for handling a given capacity of material per hour over square openings up to 3 in. Link-Belt Co.

173 Handbook on Mechanical Packings—Compiled in easy-to-read style, this 32-pp booklet describes mechanical packings, including a popular precut packing which is self-forming, self-lubricating, self-sealing. Fully illustrated with photos, provides both ordering and application information and includes a packing recommendation chart covering applications involving reciprocating, and rotary motion with steam, water, air, gases and other media. Packing Div., Pierson Co.

174 The Possibilities of Porcelain Enamel—This 20-pp booklet, illustrated in color, discusses industrial and commercial product applications of porcelain enamel outlining its various characteristics in relation to each application. Characteristics described include flexibility of size and shape, wide range of colors, durability, resistance to abrasion and corrosion, ease of cleaning, heat resistance. Booklet also describes porcelain enameling processes. Porcelain Enamel Institute, Inc.

175 Plumbing and Heating Supplies—Edition F is a 118-pp catalog listing over 2500 repair parts and precision tools for maintenance of all types of plumbing fixtures. Fuly illustrated, covers the company's line of replacement parts used in faucets, shower mixing valves, toilet tanks, flush valves, and plumbing connections for bath and sink fixtures. Includes cleaning products for plumbing fixtures and boiler compounds. Also describes company's services in surveying existing plumbing installations, training mechanics in proper repair procedures, setting up stock control systems. J. A. Sexauer Mfg. Co., Inc.

176 How to Handle Your Concrete Saw — This excellent 8-pp instruction booklet covers the care and operation of company's gasoline and electric powered concrete saws. Explains spraying of blade, choice of right blade for the job, use of the saw and necessary precautions. Describes briefly and illustrates other possible applications for this type of saw. Includes maintenance check list and directions for converting company's masonry saw into a concrete saw. Clipper Mfg. Co.

177 Modern Filtration Equipment — Methods and equipment for industrial water filtration are illustrated and compared in detail in 20-pp Bulletin 601. Pressure filtration systems are diagrammed in color to show application for practically all industrial uses. Text discusses origins of filtration practice and development of today's filter media and backwashing techniques, including continuous automatic backwashing. Cutaway views, operating data and piping suggestions for single and battery installations are provided. R. P. Adams Co., Inc.

178 Oilers and Accessories—This is the 10-pp, 1951 edition of company's catalog on oilers, oil cups, vents, tubes and special forms. Other types described and pictured include lid, right angle lid and hy-oar cap. Lynon-Dakin Co.

179 Dust Control in Metallurgical Industries—How company's dust and fume collectors serve metallurgical and mining industries is told in 8-pp illustrated Bulletin 302. Describes operation of cloth tube type collectors used in recovering dust in gases from roasters, sintering machines, induction furnaces. Tells how a wide selection of filter fabrics has increased scope of cloth filtration, so hot and/or corrosive gases may be handled. Lists some of the materials which can be recovered by filtration. Includes construction details, specifications. American Wheelabrator and Equipment Corp.

180 Continuous Centrifuge — This 8-pp bulletin describes a centrifuge for the fast, continuous and economical separation of liquids from solids, and of immiscible solutions. Covers both screen and solid bowl type units, providing illustrations, specifications and dimensions. Also gives data on a continuous demulsifier. Centrifuge Mechanical Equipment, Inc., Condenser Service and Engineering Co., Inc.

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MAINTENANCE

201 Building Maintenance — Handbook 7, offers 64 pp of information on floor surfacings, leak stoppers, external wall sealants, road patching, roofing materials. Includes instructions for use. Flexrock Co.

202 Valve Maintenance Guide — "Prevent Valve Failure Before It Starts," is a 28-pp text on valve selection, installation, inspection. Pictures damaged valves, explains how damage could have been prevented. Discusses maintenance schedules, inspection jobs, lubrication, pipe line checking, threading, regrinding, disc replacement. Jenkins Bros.

203 Drip Preventive Handbook — Insulation of pipelines, tanks, cold air conditioning ducts and wall surfaces against corrosion and condensation drip is covered in pocket-size 32-pp Form P-17. Describes coatings, tells how to prepare surfaces and apply. Includes coverage tables, humidity charts. J. W. Mortell Co.

204 Painting with Aluminum — Form AD-228, 28 pp, tells how and where to use aluminum paints. Covers painting of metal, concrete and masonry and other non-absorbent surfaces; of weather-exposed wood, and of interior heated surfaces. Aluminum Co. of America.

205 Iron Cement Handbook — This is a 40-pp pocket-size catalog of iron cements for repair, other uses. Tells how to mix and apply them. Gives illustrated instructions for dozens of repair and maintenance jobs. Smooth-On Mfg. Co.

206 Adjustable Scaffolds — Lightweight, aluminum alloy scaffolds with adjustable legs and built-in safety factors are described in this bulletin. Shows how easily scaffolds are carried and erected. Up-Right Scaffolds Div., Up-Right, Inc.

207 Insulation Protection — A long-term protective system for thermal insulation is described in Bulletin G-103. Shows how system works, how vinyl coating is applied and removed. Lists equipment for which it is recommended. Insul-Mastic Corp. of America.

208 Pointers on Scaffolding — Eight-pp Form Ps-20 gives tips on different and safe use of sectional-tubular steel scaffolding. Describes assembly parts and shows some typical combinations. Includes load test data and time study on erection and dismantling. Wilson-Albrecht Co., Inc.

209 Little Cleaner with Big Features — Construction and operating details on a small, portable vacuum cleaner with heavy-duty features of larger machine are given in Bulletin A-814. Air Appliance Div., U. S. Hoffman Machinery Corp.

210 Protective Surfacing — Bulletin 1570 presents specifications and characteristics of company's silicone coating aluminum, telling some of its uses and advantages. The Dampney Co. of America.

(Continued on page 107)

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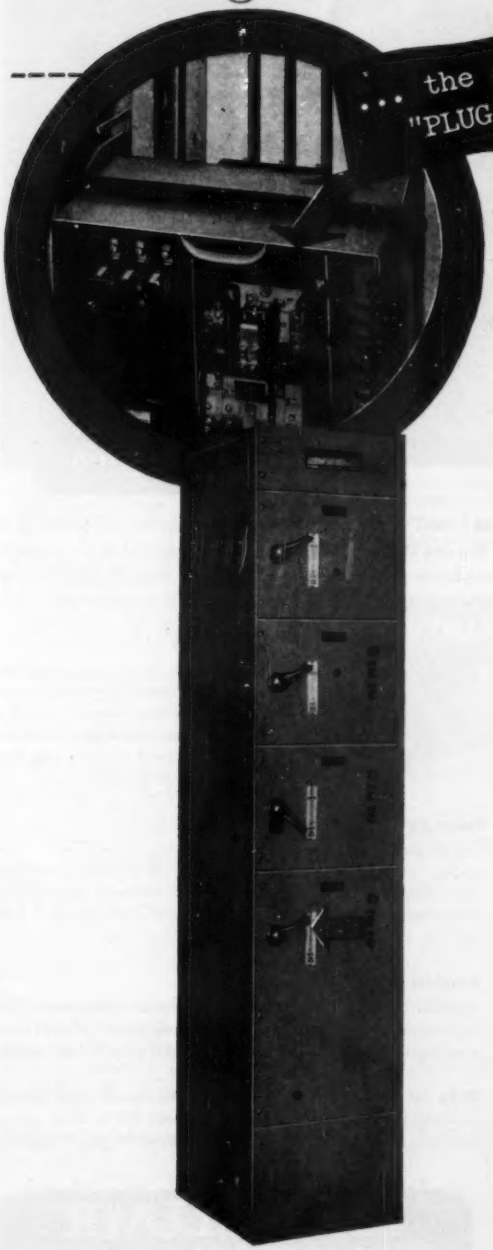

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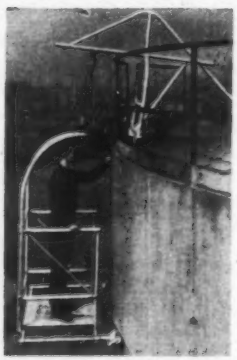

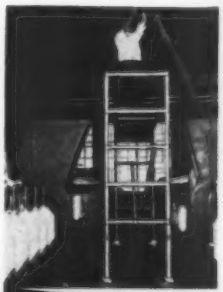

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(Continued from page 104)

CONSTRUCTION

211 Roofing Manual — Engineering data on roofing is given in Specifications 50, 30 pp. Covers coal tar pitch roofings, waterproofings, insulations, flashings, protective coatings. Includes excellent illustrated instructions for many roofing jobs. Tar Products Div., Koppers Co., Inc.

212 Hard Boards of Many Uses — Illustrated 24-pp booklet on Presdwood discusses its adaptability and types for exterior and interior use, giving physical properties. Covers finish specifications, edge and surface cutting, bending and finishing. Masonite Corp.

213 Steel Grating and Treads — Bulletin 2296, 24 pp, explains advantages of "Electroforged" steel grating, treads. Gives specifications, safe load data. Blaw-Knox Div., Blaw-Knox Co.

214 Building Panel Engineering Data — This 40-pp reference book on use of steel and aluminum panels for walls, decks and roofs, discusses their use, advantages, methods of installation. Covers acoustically treated panels, fire resistance ratings, electrification, acoustic roofs, reinforcing floor forms. Detroit Steel Products Co.

215 Glass Block and Where to Use It— This 32-pp book gives design data and general information on functional and decorative aspects of glass block. Covers properties, specifications, erection procedures. Insulux Div., American Structural Products Co.

216 Walkways and Loading Racks — Part I, Section 6 of Catalog 54 is a 36-pp data book giving application suggestions on pre-cut steel material for on-the-job erection into walkways, stairways, loading racks; instructions on use of units, layout diagrams. Black, Sivalls and Bryson, Inc.

217 For Daylight at Its Best — Form BRA 3-079FSR tells why Akio glass in daylighting installations promotes better seeing, less eyestrain, cooler interiors. Explains how it reduces solar heat. Tells how to select right type for individual plant needs. Blue Ridge Glass Corp. Libbey-Owens-Ford Glass Co.

218 Technical Data on Plexiglas — This is a file folder of application information on Plexiglas sheets, rods and molding powders, covering workability, physical properties, thicknesses. Discusses use in large area lighting. Rohm & Haas Co.

219 Let's Consider Aggregate — Bulletin 701 is an excellent 12-pp discussion of aggregate, telling what good aggregate consists of and giving recommendations for its use in producing good concrete. Illustrated throughout. Walter Maguire Co., Inc.

ELECTRICAL

220 Motor Handbook — Bulletin MU-185 provides 60 pp of engineering and descriptive data on motors, covering splash-proof and explosion-proof types, gear motors, motors for use in chemical plants, for oil well pumping, punch presses, elevators, cranes and hoists. Includes prices. Wagner Electric Corp.

221 Selenium Rectifiers — Booklet DB-19-025, on standard and high voltage selenium rectifiers for power supplies and electronic circuits, includes efficiency curves. Covers service life, back leakage, reverse and forward resistance. Life characteristics for overload conditions or high ambient temperatures are plotted. Westinghouse Electric Corp.

222 Power Distribution Feeders — Catalog TEB-1, 40 pp, on heavy-duty units for main feeders in distribution system, gives construction details, engineering and application data. The Trumbull Electric Mfg. Co.

223 Precision Switches — Twenty-pp Catalog 81 covers industrial switches for a-c circuits. Describes general purpose basic switches, auxiliary actuators, enclosed, explosion-proof and splash-proof

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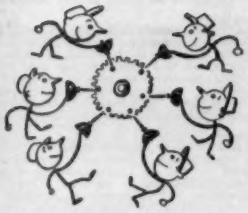

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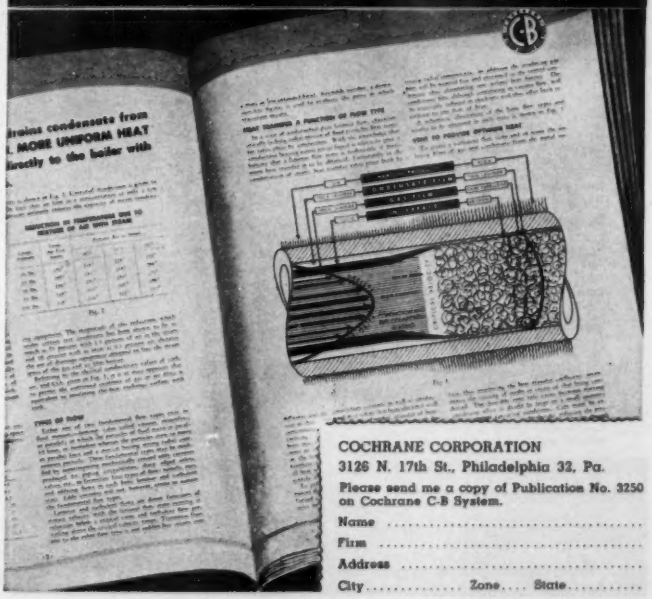

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224 Answer Card — Rules-of-thumb for answering questions on capacities and applying power-factor-improvement are printed on this small double card for computing answers to questions: How many kilovars? What power factor? How much voltage rise? Diagrams illustrate formulas. Apparatus Dept., General Electric Co.

225 Selector Switch Data — This folder of engineering information includes target sheet to aid in understanding company's push-pull selector switch. Features explanation on how switch provides single master control serving up to 18 operations. The Arrow-Hart & Hegeman Electric Co.

226 Electrical Diagram Guide — Electrical diagrams supplied with switchgear equipment are explained in Bulletin GET 1293A. Covers one-line, elementary, connection and interconnection diagrams; tells their scope; illustrates symbols used and common variations, and explains ASA device function numbers, conventions. General Electric Co.

227 Distribution Duct Engineering Data —Bulletin 427-4 contains 32 pp of data for estimating ventilated duct for feeder circuits, plug-in duct, and plug-in duct for branch circuits. Includes instructions for laying out distribution duct jobs, and pointers on estimating, diagrams, layout symbols. Buildog Electric Products Co.

228 Plug-In Power — Sixty-pp Catalog 25 offers real help on electrical installation problems involving portable tools, materials handling equipment, cranes, hoists, cutting equipment. Covers a prefabricated trolley busway electrical distribution system to provide outlets for power or light where needed — a system which can be modified for future needs. Includes specifications, mounting data, installation procedure. Feedrail Corp.

229 Power Circuit Transformers — Bulletin 501-15, 12 pp, gives descriptive information on auto and double wound dry type power circuit transformers. Includes tips on converting, isolating service, selection, also wiring diagrams, dimensions. Jefferson Electric Co.

230 Motors for Dirty Jobs — Totally enclosed, fan-cooled motors are described in Bulletin SL-300-2A. Illustrates and explains how these motors run cooler and stay cleaner. Includes dimensional and ordering data. Crocker-Wheeler Electric Mfg. Co., Div., Ellott Co.

231 Power Distribution Cable — Bulletin RR-1 describes an economical multi-purpose cable offering super-aging, heat and moisture resistant insulation as well as a Neoprene sheath. Illustrates construction of cable. Rome Cable Corp.

232 Voltage Control — Bulletin 547, covering variable transformers and voltage regulators, describes available models, giving specifications, ratings and connection arrangements. Also describes electro-mechanical regulators. Includes prices. The Superior Electric Co.

233 Volt Ammeter—A seven-range, clip-on volt ammeter is discussed as to design and use in illustrated List In. 17V. Explains features. Ferranti Electric, Inc.

MATERIALS HANDLING

234 For Efficient Overhead Handling — Bulletin C-1, 56 pp, pictures overhead equipment for practically all industries. Stresses construction, safety, electrical advantages of trolleys, cranes, track and auxiliaries. The American Monorail Co.

235 Handling and Processing Equipment — Catalog 791, 32 pp, covers feeders, bin valves and level indicators, reduction machinery, vibrating screens and processing equipment, separators, elevating and conveyors, packers; chains and transmission machinery. The Jeffrey Mfg. Co.

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236 Handling Equipment Ordering Book —Ninety-pp Catalog 23 describes power trucks, power jacks, stackers, cranes, hand trucks, platforms, storage racks. Fully illustrated. Lewis-Shepard Products, Inc.

237 Manual on Electric Hoists — Catalog H-46, 44 pp, covers monorail and stationary hoists and car pullers. Explains fundamental types of grabs, methods of hanging I-beams, types of hoist suspension, controls; gives dimensions. American Engineering Co.

238 For Overhead Moving — This is a booklet of engineering and application data on tramrail equipment, telling how it can improve plant's handling methods. Shows system's rail and arch design, switches, cranes and transfer bridges, hand-operated carriers, hoists, cranes, buckets, grabs. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

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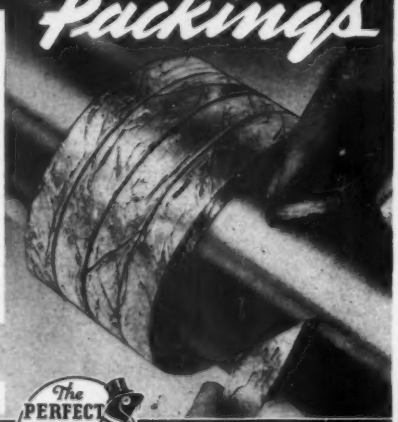

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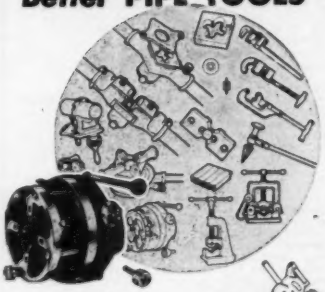

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239 Handbook on Overhead Conveying Systems — Manual A-56 provides 200 pp of information on overhead track systems and conveying equipment. Pictures installations, construction details; gives engineering and application data. Richards-Wilcox Mfg. Co.

240 Trucks, Handling Equipment — Bulletin 170A gives an over-all picture of company's power and hand lift trucks, portable and hydraulic freight elevators, other equipment. Revolvator Co.

241 Trucks, Casters, Wheels — Catalog 50, 64 pp, covers platform trucks, superstructures, two-wheel and pry trucks, dollies, trailers, casters, wheels, offering a wide range of chassis, superstructure and wheel combinations. Thomas Truck & Caster Co.

242 Motorized Lift Trucks — Lift trucks with two front driving wheels, dynamic brake and power lift, are covered in Form K-48. Illustrates both platform and pallet models, special power features. Also describes a similar truck with rear wheel drive. Lift Trucks Inc.

243 Portable Hoists — This bulletin describes a lightweight air hoist in 2000, 1000, 500 and 300-lb capacities. Gives specifications, dimensions, operating advantages. Shows hoists in use. Keller Tool Co.

244 Fastenings for Conveyor Belts — This collection of data covers hinged fastenings, repair plates, lacings, hooks, round belt couplings, also lacers and cutters. Gives instructions for use. Also describes gear, wheel and bearing pullers. Armstrong-Bray & Co.

245 Fast-Working Hoists — Bulletin W-815-B, 6 pp, provides electrical details on company's hoists — on wiring, brakes, motors and fast-operating, push-button controls. Standard, outrig, and multi-speed controls and limit switches are described. Shows some unusual speed combinations available. Hoist and Crane Div., Robbins & Myers, Inc.

246 Specifications on Handling Equipment — Form TC-44, an 8-pp condensed catalog, gives basic specifications on fork-lift trucks, both gas-powered and electric, on solid and pneumatic tires; industrial towing tractors; tructractors for bulk materials, and special attachments. Industrial Truck Div., Clark Equipment Co.

247 Conveying Systems Manual—Unloading and conveying of dry pulverized material are discussed in 24-pp Bulletin PK-25. Text covers system and its operation, also stationary pump and related equipment. Fuller Co.

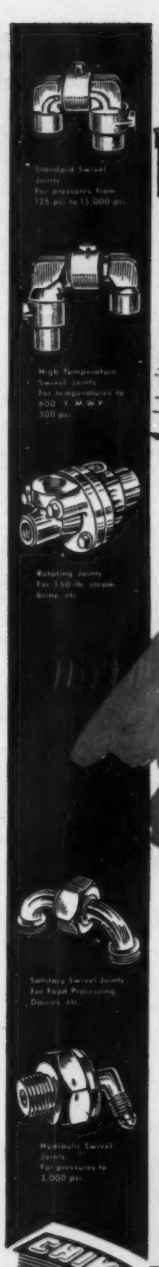
249 Lifting Equipment—Bulletin 445 describes and illustrates hand-operated platform lifting devices in both light and heavy duty types, with capacities from 500 to 2000 lb. Includes photos of these portable elevators in use. Economy Engineering Co.

MECHANICAL POWER TRANSMISSION

250 Chain Drive Manual—Catalog SCE-50, 68 pp, on chain drives, cites advantages and recommends applications. Gives information on chain length calculations, installation and maintenance, ratings, chain types, pitch and sprockets. Includes prices. Whitney Chain & Mfg. Co.

251 Steel Shaft Data — Bulletin G-7, 20 pp, contains formulas, curves and tables for determining proportions, stresses, combined torsional and bending loads in round, square, hollow, keyway and stepped shafts. IMO-DeLaval Products Div., De-Laval Steam Turbine Co.

252 Gear-Type Coupling — Bulletin 101 tells why this coupling can provide long-run economy when used with gas blowers, turbine driven pumps, mills, compressors. Fast's Coupling Dept., Koppers Co., Inc.



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CHIKSAN Engineers will gladly cooperate with you in selecting the correct Types and Styles of Swivel Joints for your particular requirements...and in specifying the proper Packing Unit for the fluid you handle. This valuable, experienced counsel costs you nothing.

*For full 360° rotation in 1, 2 and 3 planes. Unlimited flexibility in pipe lines can be secured simply by arranging swivels in proper sequence.

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BALL-BEARING SWIVEL JOINTS FOR ALL PURPOSES

253 Longer Life for Bearings — Bulletin 57B describes an economical three-step metallizing process which provides hard, oil holding surfaces for new and worn bearings. Metallizing Engineering Co., Inc.

254 Manual on Power Transmission Machinery — Containing 225 pp of helpful data, this illustrated handbook covers roller bearings, V-belt drives, friction clutches, couplings, collars, sleeve bearings, pulleys, take-ups and hangers. Provides full engineering, selection and ordering information; includes formulas, installation photos. Dodge Mfg. Corp.

255 Power Drive Handbook — Catalog 700, describing roller chains and sprockets, includes tips on selecting stock roller chains for every type of power drive service. Diamond Chain Co., Inc.

256 Hydraulic Couplings — Bulletin 3924 is a 24-pp collection of advertisements on use of hydraulic couplings in power plants. Feature on-the-job interviews and show increased plant efficiency afforded by use of fluid drives. American Blower Corp.

PUMPS, COMPRESSORS

257 Centrifugal Pump Care — Sixteen-pp Bulletin 06X6256A is a handbook on the care of all makes of centrifugal pumps. Tells how to figure head, determine friction loss. Discusses causes of troubles and their cures, includes maintenance timetable. Tells how to prevent cavitation, common mistakes in packing stuffing boxes. Allis-Chalmers Mfg. Co.

258 Centrifugal Pumps — Single- and two-stage pumps for such applications as small boiler feed service, cooling tower service, bottle washing, brine circulation, general water service, hot well service are described in Bulletin W-306-B1. Includes ratings, how to select a cold water pump. Worthington Pump and Machinery Corp.

WALL FLUSH PEDAL

For flushometer water closets; fits new, old installations

Said to be the only wall type pedal attachment on the market, the new Easy Flush Pedal is offered as a solution to the problem of flushing toilets without touching the valve handle. Besides its sanitary aspects this easily-operated unit is also claimed to prevent valve sticking and reduce valve maintenance. Approved Products Co., 205 E. 42nd St., New York 17, N. Y.

259 Two-Stage Compressor — Data on a precision-built, two-stage, air-cooled compressor is given in this 16-pp bulletin. Includes selection chart showing dimensions, cylinder arrangement. Joy Mfg. Co.

260 Self-Priming Pump—Bulletin 636.1, on a new line of self-priming pumps, explains their valveless design and principle of operation. Goulds Pumps, Inc.

261 Technical Papers on Compressors — Centrifugal and axial compressors, their applications and methods of drive are discussed in 32-pp Form CH-49. Covers high pressure centrifugal compressor applications, commercial applications of centrifugal compressors and the complementary axial, centrifugal compressors for pipeline duty, and the gas turbine applied to high pressure centrifugal pipeline booster. Clark Bros. Co., Inc.

262 How to Solve Pumping Problems — Form 3060 is a 130-pp manual on selection and use of pumps. Tells type of pump construction best suited for handling 150 liquids. Explains how to determine size, to compute suction list and discharge head, to determine direction of rotation and size or speed of pulleys or gears. Gives instructions for installing rotary pumps, locating trouble in pump installations, and maintaining pumps. Includes excellent technical data. Geo. D. Roper Corp.

263 Pump Catalog — Turbine type and centrifugal pumps for industrial pumping jobs are described in this 12-pp booklet. Discusses features. Aurora Pump Co.

PIPING, TRAPS, FITTINGS, STEAM ACCESSORIES

264 How to Cut Steam Costs — Bulletin 250 tells how a differential drainage and boiler return system reduces steam costs. Layout drawings of installations included. Stickle Steam Specialties Co.

265 Steam Hook-ups—This 64-pp manual on hook-ups for steam traps, air vents and temperature controls provides diagrams, size calculations, selection data on traps and regulators, properties of saturated steam, dimensions. Sarco Co., Inc.

The 7-Range Clip-On Volt-Ammeter

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Offers These Important Advantages

- Measures up to 1000 amps up to 600 volts.
- Convenient ONE HAND operation trigger action.
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- Takes cables up to 2¼" diameter.
- Distinct calibrations—easy to read.
- Suitable for 50-70 cycles.

RANGES: 0-10 *amps*; 0-25 *amps*; 0-100 *amps*; 0-250 *amps*; 0-1000 *amps*; 0-150 *volts*; 0-600 *volts*

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FOR HEAVY CONVEYOR BELTS OF CHANGING LENGTH

These heavy-duty belt fasteners make a strong, flexible joint in conveyor belts, belts of any width and of from ⅜" to ½" thickness. They offer special advantages in mines, quarries or industrial setups where length or position of belt is frequently changed, because sections can be removed or added at will. Joints are opened for this purpose by simply pulling out the hinge pin.

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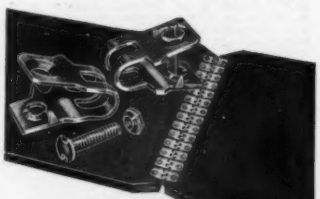

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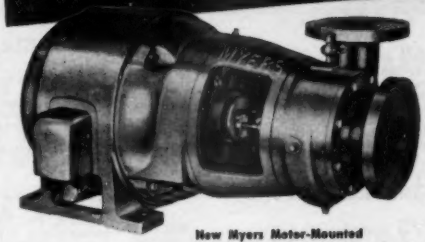
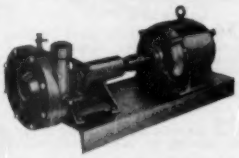
IN THE WEST—THE COLORADO FUEL & IRON CORP. • Denver 2, Colorado
ON THE PACIFIC COAST—THE CALIFORNIA WIRE CLOTH CORP., Oakland 6, Cal.

New Myers Centrifugal Pumps...



New Myers Motor-Mounted Centrifugal Pumps. Extra compact. Exceptionally rugged. Perfectly aligned and balanced impeller. Sizes, 1 H.P. to 20 H.P.

New Myers Belt-Driven Centrifugals. V-Belt or flat belt drive. Oversize shaft is removable from either end of pump.



New Myers Direct-Connected Centrifugals. Available with or without motor. Sizes, ½ H.P. to 10 H.P.

pay for themselves in savings alone!

This outstanding new Myers line of Centrifugal Pumps features highest interchangeability of parts; replaceable wearing rings; shafts fully protected against liquids and wear; easy replacement of casing and impeller to suit changing conditions. And these are but a few of the many advantages combined in these latest Myers Pumps—improvements that guarantee greater operating efficiency and economy under steadiest, hardest service. New Myers Centrifugal Pumps are available in types to handle any liquid, at temperatures to 200° F. Capacities range from 10 to 650 gpm., against heads up to 280 ft. Specifications and name of nearest distributor sent on request.

Write for full list of sales features — offered for the first time in New Myers Centrifugal Pumps!

THE F. E. MYERS & BRO. CO.
Dept. T-215, Ashland, Ohio

266 How to Choose and Use Air Traps—Bulletin 202 describes air trap selection and installation for automatic drainage of moisture from compressed air intercoolers, aftercoolers, receivers, separators and drip points. Tells how traps work, where to use them; includes prices. Armstrong Machine Works.

267 Steam, Air, and Gasoline Traps — Illustrated Catalog 250 describes several types of thermostatic steam traps, expansion steam traps, weight-operated traps for steam, air, gasoline, piston-operated steam traps, also steam, air and gas separators. Complete with capacity tables, installation diagrams, typical applications. W. H. Nicholson & Co.

268 Strainers and Separators — Bulletin R-46-50A is a 16-pp catalog on T-type strainers, suction strainers, multi-flow and receiver separators. Contains dimensions, weights, prices. Shows how several types have been redesigned for increased efficiency. Includes dimensions, service pressure ratings. American District Steam Co.

INSTRUMENTS, CONTROLS

273 Hydrometers for Industry — Bulletin G, 16 pp, presents hydrometers graduated in conventional scale ranges for routine testing, special instruments of extreme accuracy, standard instruments. Gives ranges, intervals of graduation; includes density and volumetric tables. Precision Thermometer & Instrument Co.

274 Pressure Regulator—Bulletin 1-B, 8 pp, discusses design, operation and uses of a super-sensitive pressure regulator. Also covers a compound regulator for controlling back pressure relief valve and high pressure make-up valve. Atlas Valve Co.

275 Control Equipment—Thirty-pp General Catalog 001 is on measuring and control equipment for water and sewage works, power and processing industries. Describes venturi tubes and meters, controllers, gages, manometers, pilot equipment. Includes capacity tables, layout drawings. Simplex Valve and Meter Co.

276 Industrial Control Devices — Catalog 8303, 64 pp, presents 100 models of non-indicating electric, electronic, and pneumatic controllers for flow, pressure liquid level and humidity applications. How instruments are shown, including electronic temperature controllers. Illustrated. Includes dimensions, engineering data. Brown Instruments Div., Minneapolis-Honeywell Regulator Co.

FUELS, LUBRICANTS

278 The Why, What and How of Lubricants — This 20-pp booklet explains and illustrates common tests and terms describing lubricants. Covers viscosity, flash and fire, neutralization, number, penetration, specific gravity, extreme pressure, steam emulsion, corrosion. Tide Water Associated Oil Co.

279 Viscosity of Fluids—The larger significance of viscosity is discussed in Nos. 5 and 6, Vol. 36 of Lubrication, a technical publication. Illustrates simplest conception of streamline flow between two surfaces having relative motion. Shows how viscosity acts and may be measured. Covers streamline flow in small tubes, turbulent flow in pipes. The Texas Co.

280 The Answers on Turbine Oil — This handy 2-pp booklet answers the questions: What causes deposits of sludge? What causes acidity increase? What causes corrosion in turbines? Explanations are brief, illustrated. Standard Oil Co. (Indiana)

281 Test Data on High Temperature Oils — Results of research program on high temperature lubrication are told in Bulletin 2-416. Describes procedures used in setting up three series of oils to meet conditions to and over 500 F, including straight mineral oil, semi-synthetic lubes and colloidal graphite in light carrying oil. E. F. Houghton & Co.

DUST CONTROL

282 Tubular Dust Filters — Advantages, uses and design of tubular dust filters are given in Bulletin 24-D. Presents both single compartment and automatic continuous multi-compartment units. Describes bag shaker mechanism, dust discharge valve, dust hoppers, housing. Ruemelin Mfg. Co.

283 Dust Collectors — Operation, construction, versatility and maintenance of company's unit dust collectors are explained in this bulletin. Includes capacities, sizes. The Kirk and Blum Mfg. Co.

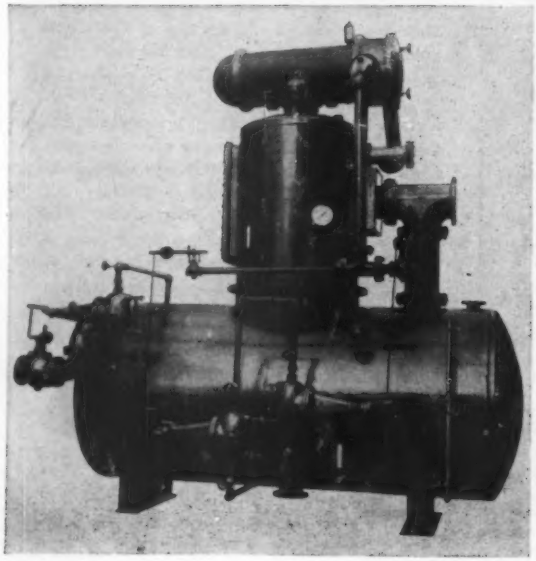
284 Dust Control—Bulletin 98 explains value of industrial dust control and principles of dust suppression, collection by filtration. Describes dust control equipment, providing specifications, dimensions on filters, systems, automatic controls. The W. W. Sly Mfg. Co.

285 Electric Blowers — Illustrated Bulletin 573 describes portable electric blowers in ½ to 1½ hp sizes for removing dust, dirt, grit and grindings from motors, bearings, shafting and gears. Emphasizes economy in cutting production and repair costs, saving power. Breuer Electric Mfg. Co.

286 Vacuum of Many Jobs — Bulletin 144, 20 pp, describes and illustrates 132 unusual industrial uses for company's vacuum system. The Spencer Turbine Co.

287 Dust Control Economy — Bulletin 900A, 25 pp, covers reasons for controlling industrial dusts and use of dust control equipment. Pangborn Corp.

New! Stickle "Spray-Tray" Feed Water Heater



Eliminates Costly Corrosion! Boosts Boiler Efficiency!

At left, the new Stickle "Spray-Tray" Feed Water Heater—the seventh Stickle Heater* to be installed by a single, mid-western state in its local institutions.

Deaerating storage-type heater is equipped with stainless steel spray and tray system—has a maximum heating capacity of 5,000 B.H.P.; a storage capacity of 300 cu. ft. It is particularly designed for zero oxygen operation to protect boilers, steam and return lines, etc., from destructive corrosion, and increase boiler efficiency. As in all Stickle Heaters, open coil construction brings feed-water into direct contact with the steam—immediately transmits heat from steam to water—*cutting your fuel costs 10-15%!*

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*Stickle Open Coil Heaters are available in a wide variety of sizes — in capacities ranging from 3,000 to 250,000 lbs.

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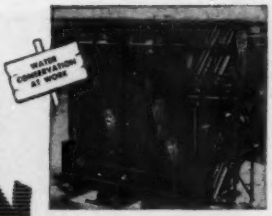

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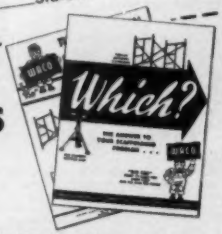

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World's largest maker of coated industrial gloves—
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PACKINGS, OIL SEALS

288 Data on Packings — Form 428 is a collection of bulletins on flexible metallic packing, semi-metallic packing, rotary mechanical seal, oil pressure system and steel packing tools. Includes both descriptive and engineering data, comes in folder for filing. Durametallic Corp.

290 Oil Seals and How to Use Them — Bulletin PK-46A, a 16-pp handbook, provides photos showing where to use oil seals and how to install them. Drawings show how lip and heel construction of these non-metallic seals can be varied. Johns-Manville.

TOOLS, WELDING

299 Tool Catalog — Hand and power tools, tool sets, kits and related equipment are presented in 110-p Catalog T. Includes descriptive, ordering and application data. Snap-On Tools Corp.

300 Welding Electrode Ordering Guide—Pocket-size Catalog R7-7 on electrodes for hard surfacing and for welding stainless, alloy and mild steels, includes operating characteristics, current ranges, tensile strengths, polarity. Harnischfeger Corp.

302 Pipe Tools, All Kinds—Catalog 50, 36 pp, covers pipe tools, machines, power drives, threading oil. Products illustrated and operational advantages explained. Includes ordering specifications, price list. Beaver Pipe Tools, Inc.

SAFETY, SANITATION

303 Dry Chemical Extinguishers — New quick-acting fire extinguishers of the dry chemical type in 20 and 30 lb sizes are covered in Form C-104. Shows how this self-contained unit is designed, operated, explains on-the-scene recharging. C-O-TWO Fire Equipment Co.

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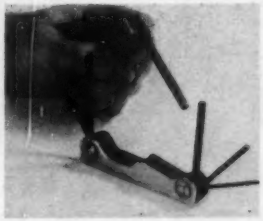
Is built to fit popular-sized socket head screws and bolts

The Smitty has five of the most popular, standard-size socket head wrenches that fold knife-like into its sturdy handle. It is small enough to fit in a pocket, but designed to permit increased leverage and give easy access to tight spots. Individual wrenches are tempered steel; can be replaced when worn. H. D. Hunter Co., 1755 Glendale, Los Angeles, California.



304 Washroom Layouts—Blueprint drawings of 20 washroom layouts for industrial and institutional buildings are presented in Bulletin D507. Explains factors to be considered in washroom planning. Includes typical roughing-in data, photos. Bradley Washfountain Co.

MACHINE MOUNTINGS

305 Shock Absorbers for Machines—This folder describes a vibration isolating and shock absorbing material for use as machine mounting or as component parts. Explains how material functions and is installed. Fabreeka Products Co.

306 Improved Machine Mountings—Catalog Section 7290 gives installation procedure for company's Vibropad rubber mounting. Pictures parts, also installations on vertical and inclined machines. The B. F. Goodrich Co.

VALVES

307 Air Control Valve Data — A new knob-operated air control valve with die cast body, for air, water, or oil service, pressures to 175 psi and temperatures to 125 F is described in this single-sheet bulletin. Dimensions, mounting data included. Valvair Corp.

308 Bonnet Valves—"Pressure-Seal" bonnet valves are described in Form AD-1819. Includes sizes, ratings, and tests for gate, globe, angle and stop check valves as recommended for high pressure and temperature service. Tells their operating advantages, how seal is made. Crane Co.

309 Reducing Valve Engineering Data—Bulletin 962 explains how the contour of a pressure reducing valve contributes to efficiency of performance. Discusses straight-line flow, wide opening and tight closing. A. W. Cash Co.

(Continued on page 118)

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FOR BROKEN
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Makes
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Resurface or patch broken concrete floors with tough RUGGEDWEAR resurfacer. Here's a material which will stand up under the most punishing traffic conditions. Simple to install—no chopping or chipping required. Merely sweep out the spot to be repaired—mix the material—trowel it on. Holds solid and tight right up to irregular edge of old concrete. Provides a firmer, tougher, smoother, more rugged wearing surface. Used indoors or out. Dries fast.

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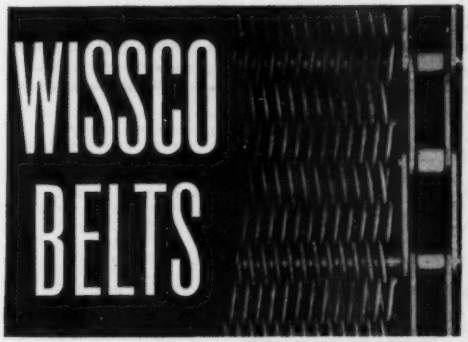
WISSCO BELTS



step up production – cut down handling costs

Faster, uninterrupted production . . . in heat treatment of metals, glass and ceramics; and in processing of foods, rubber, textiles, veneers and numerous other products . . . is assured with dependable, long-wearing Wissco Belts.

Fabricated in special weaves and alloys—with or without chain edges—Wissco Metal Processing Belts have high resistance to corrosion, abrasion and temperature extremes.

Write for illustrated booklet describing the many uses and cost-cutting advantages of Wissco Belts.

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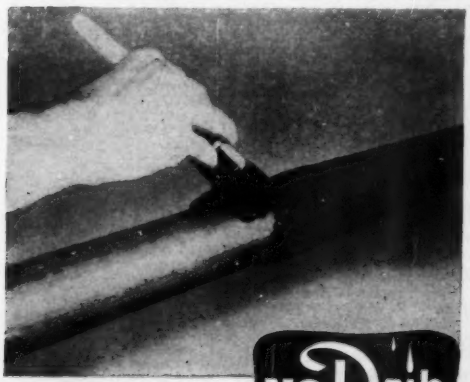

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Anyone can brush, trowel or spray NoDrip on any clean, dry surface. Goes on like plaster, forms a seamless, protective coating. *Stops condensation drip.* NoDrip keeps equipment and floors safe and dry; prevents corrosion of metal and prolongs its life. Acid, alkali and brine resistant. Comes in 1, 5 and 55 gal. drums, ready for use.

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Apply NoDrip to a small area, compare the results with uncovered portion.

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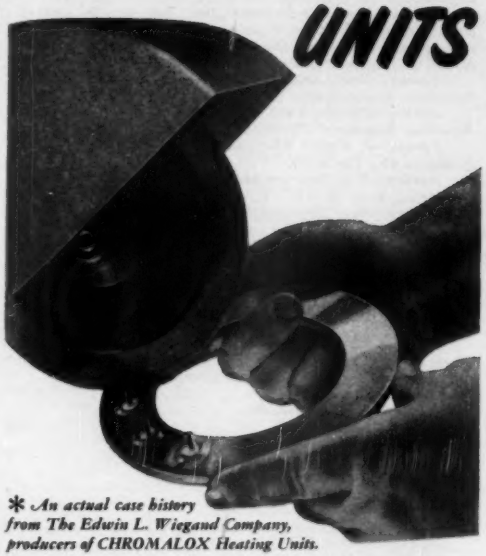
POLISHES 10,000 HEATING UNITS



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WHEN this company needed a way to take the ragged edges off heating units economically and *fast*, they turned to sturdy, tough Pittsburgh Brushes for the answer. The 6″ Pittsburgh steel wire brushes like that shown above polish 10,000 heating units during their life.

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Pittsburgh's complete line of brushes of every type, for every purpose, will provide a practical, economical solution of any brush problem you might have. Drop us a line on your company letterhead for a copy of our new booklet that shows, through actual case histories, how Pittsburgh can help cut your brushing operation costs. Address: PITTSBURGH PLATE GLASS COMPANY, *Brush Div.*, Dept. W-11, 3221 Frederick Ave., Baltimore 29, Md.

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315 Bibliography on Monel — List B is an 8-pp bibliography of company's literature on Monel, R. Monel, K Monel, KR Monel, S Monel, Inconel, Inconel X, also Duranickel, nickel and low carbon nickel. Covers material of general interest, technical data on properties, uses, also publications of special value in processing, electrical, petroleum, welding, other fields. The International Nickel Co., Inc.

316 Heat Exchangers — Bulletin 11.0.080 describes air cooled heat exchangers for condensing or cooling of steam or process vapors, natural gas, jacket water, lubricating oil, quenching baths. Equipment Div., J. F. Pritchard & Co.

317 Visual Planning Equipment — The importance, application and cost of three-dimensional planning materials are presented in this file of data. Tells how proper planning is basis for manufacturing cost reductions. Includes photos of typical visual layouts, prices. "Visual" Planning Equipment Co., Inc.

318 Pipe, Couplings, Joints — Composite Catalog 50 illustrates more than 500 ball-bearing swivel joints for temperatures from -25 F to 600 F and pressures from vacuum to 15,000 psi in sizes from ⅜ to 13 in. Also carries data on steel rotary hose, metal marine and barge hose, steel cementing and circulating hose, circulating heads and mud guns. Unions, blocks and thread compounds and low pressure gas burners are also shown. Prices included. Chiksan Co.

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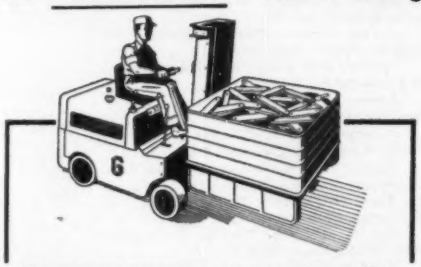

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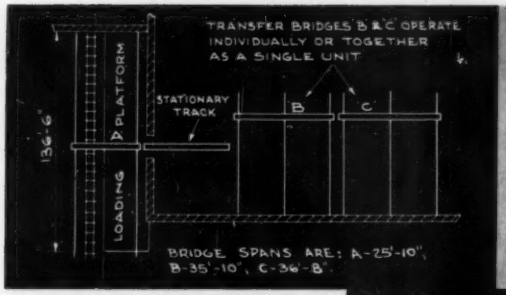

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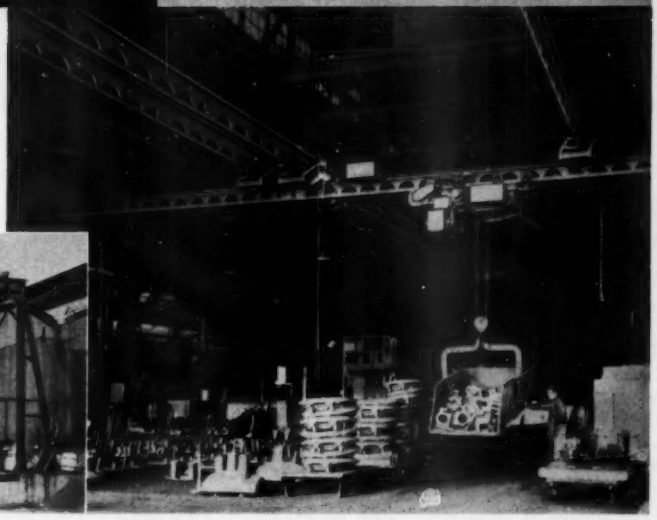

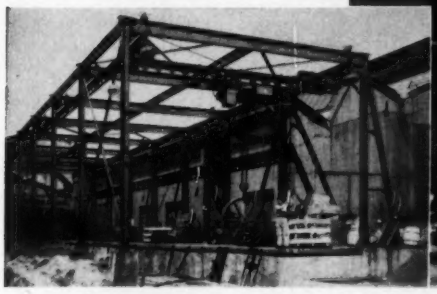

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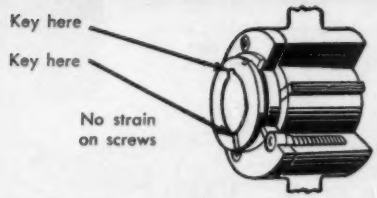

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